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The Key of the Pacific

BY THE SAME AUTHOR.

ACROSS CHRYSÊ.

AMONGST THE SHANS.

THE OPENING OF CHINA.

MATABELELAND: OUR POSITION IN SOUTH AFRICA.

Joint Author of

REPORT ON RAILWAY CONNEXION OF BURMAH AND CHINA.

The Key of the Pacific

The Nicaragua Canal

BY

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WITH NUMEROUS ILLUSTRATIONS PLANS AND MAPS

CHEAPER ISSUE

NEW YORK
LONGMANS, GREEN, & CO.
1898

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PREFACE.

THE late war in the Far East, the inevitable opening up of China, the approaching completion of the Siberian Railway, and the certain cutting of the Nicaragua Canal, constitute one of the greatest revolutions in the world's history. These will be followed by a new adjustment of international relations, and a fresh distribution of the world's trade. The present volume deals with one of the chief aspects of this revolution.

As a pioneer of commerce in Burmah, Indo-China, China, and South Africa, as explorer, administrator and special correspondent, my constant aim has been to aid in opening up fresh markets on the fringes of our empire. I have long held the view that the true policy for this country is to foster and develop the existing trade with our colonies and possessions, and to open up entirely new markets, and I have done what I could, on the platform and in the press, to awaken the country to the importance of this line of action.

This policy I believe to be necessary, not only to benefit the merchant, the manufacturer, and the working man, but as affording the main remedy for the depression of trade, and the true solution of the pressing problem of the unemployed.

Of all fields for the expansion of our commerce, the Far East, I am convinced, affords us the greatest opportunity. To this market I have for many years endeavoured to turn the attention of the commercial community, and it was on realizing the part that the Nicaragua Canal would play in opening up the Far East —involving immense changes not only for the United States, but for this country and Europe generally—that I determined to study the question of inter-oceanic communication between the Atlantic and Pacific, and to see how and to what extent our interests would be affected by the Canal.

The reader will find in these pages the results of an examination of the problem in all its varied bearings— mechanical, commercial, and political — made on the ground and in the study, and of general observation and travel in Nicaragua.

In the spring of this year I crossed from Colon to Panama, following the route of the Panama Canal from the Atlantic to the Pacific, and later traversed Nicaragua from Ocean to Ocean, along the line of the proposed Canal, excepting the Pacific terminus, which I was unable to visit owing to the political consequences of the Corinto incident.

The facts embodied in this work point with irresistible force the lesson that, with increased competition with the United States in the Far East as the inevitable result of the opening of the Nicaragua Canal, we shall have to bestir ourselves if we desire to maintain our commercial supremacy.

I would here acknowledge my indebtedness to Mr. Menocal, the Chief Engineer of the Construction Company for valuable information supplied, and for the assistance he gave me in prosecuting my studies in Nicaragua. To the proprietors of "The Graphic" my thanks are due for permission to reproduce some twenty of the numerous illustrations given in the book. I must also record here the courtesy and attention received by me, in a pleasant journey to and from Central America, at the hands of the officials and officers of the Royal Mail Steam Packet Company, especially its Secretary, Mr. J. M. Lloyd.

A. R. C.

London :
October 31st, 1895.

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THE KEY OF THE PACIFIC.

THE KEY OF THE PACIFIC.

Chapter I.

THE THREE MAIN SCHEMES.

FOLLOWING the discovery of gold in California and the opening up of the Pacific coast, interest was naturally revived in the question of providing an alternative route, safer, more rapid, and less costly, to that round Cape Horn, or across the wild country and passes of the Rockies. The result was the construction of the Panama railroad in the period between 1850 and 1855. A reconnaissance of the Isthmus of Tehuantepec was carried out, and negotiations were also entered into with Nicaragua to support a company which had obtained from that republic the right to build a canal, and in the interval to establish—overland, and by existing waters *viâ* the San Juan and Lake Nicaragua—a means of transit between the Atlantic and Pacific. The survey of this route, made for Cornelius Vanderbilt and his associates, was executed by Colonel O. W. Childs, of Philadelphia, a distinguished officer of the United States army. His studies fully conformed to the requirements

of engineering science, and are remarkable for their accuracy.

From 1870 to 1876, during the presidency of General Grant, renewed activity was shown by the United States Government in exploring the isthmus, and in 1879 work on the Panama route was begun by de Lesseps, only to be abandoned ten years later.

There resulted about the year 1879 three well-defined schemes, arrived at by a process of elimination, namely, those of Panama, Nicaragua, and Tehuantepec. The notorious Panama Canal may now be pronounced nearly moribund, if not actually dead. The Tehuantepec ship-railway passed, at least for the time, out of sight and favour with the death of its illustrious designer, Captain Eads, of Mississippi fame. The Nicaragua Canal holds the field, and although, owing to causes given later, the actual work is in abeyance, strenuous efforts are being made to secure the active support of the United States Government, and are likely to be crowned with success, in which case the work will be prosecuted with vigour. The canal is a necessity of the time, and cannot now long be delayed.

The Panama Canal.

It is unnecessary to give any but a brief notice to the Panama Canal, but the salient points in its history must be noted.

De Lesseps held that a *sea-level* ship-canal could be constructed across the isthmus at Panama, and that it was





VIEWS ON THE PANAMA CANAL.

the shortest practicable line between the oceans, the length of the route being 46⅓ miles, and the altitude to be overcome about 300 feet.[1] He was opposed by many eminent engineers, including M. Lavalley, who spoke in prophetic language of *la grande inconnue de la Chagres.* But the Congress of 1879, summoned by Lesseps, supported *le grand Français*, and the work, designed without locks, was inaugurated in 1879, the actual excavation being commenced two years later. In 1887 the impracticability of a level canal, at least with the financial means available or in prospect, at length became so evident that Lesseps and his colleagues were compelled to abandon the idea, and M. Eiffel was called in and designed a series of locks. After many vicissitudes, work finally ceased in March, 1889, owing to want of funds. The magnitude of the enterprise is shown by the following official figures of the liquidator, dated July, 1890:

Total expenses at Panama	£31,330,937
Total expenses in Paris	15,628,066
Purchase of Panama Railway Shares. .	3,730,727
Payments to the Civil Society of Obligations for the lottery scheme . . .	1,290,587
Payment to the Colombian Government	98,203
Total,	£52,078,520

There is no need to go over the ground of the *débâcle*, the history of which has never been fully told, and never will. The company could only show work done to the value of something like £28,000,000, the difference (over

[1] The railway has an elevation of 296 feet, with a summit cut of 30 feet.





VIEWS ON THE PANAMA CANAL.

£24,000,000) having disappeared into that bottomless gulf—the pockets of the vast army of company promoters, corrupt journalists and politicians, swindling engineers, and contractors.

The adoption of the lock system, forced upon him by dire necessity, was very unpalatable to Lesseps, more especially on account of the views he had expressed on the proposed Nicaragua Canal, for it must be mentioned as a singular fact that Lesseps in his "Souvenirs," as well as elsewhere, actually expressed the opinion that "it was very clear the Nicaragua Canal was the best of canals with locks, if one were compelled to adopt that system."[1]

Many proposals for recommencing the work have been put forward since 1889, the plan generally adopted being for a canal with six or eight locks, to feed which artificial lakes or reservoirs have to be created, in order to avoid so far as possible the deep cutting through the divide. In 1890, a further concession of time till October 31st, 1894, was granted by the Colombian Government, within which to form a new company and resume work,[2] and in

[1] "Il faudrait couper le seuil de Rivas," he wrote, "par une tranchée profonde, y mettre encore sept écluses, et créer aux deux extrémités du canal, à Greytown et Brito, des ports sur des côtes difficiles. Les défenseurs de ces projets vantaient la supériorité du climat, faisaient valoir l'abondance des matériaux du pays, la densité relative de la population, et il etait bien évident que le canal de Nicaragua se présentait comme le meilleur des canaux à écluses, si l'on eut été réduit à adopter ce système." *

[2] In the event of the expiry of the concession, all the canal buildings will become the property of the Colombian Government, and the land

* "Souvenirs de quarante ans," p. 463, vol. i.





VIEWS ON THE PANAMA CANAL.

the autumn of 1894, a new company, the *Compagnie Nouvelle du Canal du Panama*, was formed with a capital of £2,600,000 (65,000,000 fr.). Operations were commenced on the Culebra cut last October (thereby just saving the concession), and work is in hand. It is claimed that a thorough survey of the isthmus,—including an elaborate system of borings, to ascertain the exact nature of the soil and rocks at all depths, and to determine the permeability of the ground,—has been commenced by a large staff of engineers, and that a definitive plan will be settled in 1897, when a technical commission will proceed to the ground, and decide as to the possibility, or otherwise, of the completion of the canal. But there cannot be much doubt as to the *motif* of the *Compagnie Nouvelle*, in which M. Eiffel is believed to be the chief shareholder.

Can the Panama Canal be completed? Even if proved to be practicable, it is extremely doubtful whether the French people would ever again subscribe the required money, or their government lend its support to the scheme. With this, however, I am not concerned. But is it practicable? Can the engineer overcome the physical difficulties?

When in Central America, in addition to my examination of the Nicaragua Canal, I made a personal inspection of the Panama line, paying special attention to the two main difficulties,—the Chagres river and the Culebra cut. A number of estimates of work done, and to be done, to

already conceded will revert to the State. The machinery, which cost a fabulous sum, would bring in little if sold, for the cost of removal would generally be very great.

carry through the canal with locks, have been published. The general conclusion I arrived at, however, was that, if a lock canal were feasible, for practical purposes not more than one-third of the total work required to complete it has been executed, and that the remaining two-thirds would involve a *genuine expenditure* of largely over £40,000,000. The cost of completing the work, according to the reports of the last Commission, is:

Excavations	£11,606,000
Locks	4,400,000
Dams	2,120,000
Water passages	206,000
Deviation of the railway	420,000
Indemnities, etc.	640,000
Lighting	40,000
Total	£19,432,000

To this they add:

For unforeseen expenses	3,750,000
	£23,182,000
For increase of staff, due to climatic difficulties, say 10 per cent on above	2,320,000
	£25,502,000
Interest during construction, eight years, on moneys as required	10,440,000
	£35,942,000
Say, in round figures	£36,000,000

A portion of the Chagres river has been utilized for the canal, which, for some miles, is made in its valley. At Matachin the canal leaves the Chagres, and following the

valley of one of its tributaries, passes through the Culebra Hill, situated on the divide formed by the Cordillera, the backbone of the isthmus. On the Pacific Slope the descent is by the valley of the Rio Grande, entering the Pacific at the port of Panama.

On the occasion of my visit I found that some four or five hundred men were being employed, and these almost entirely on the Culebra cut; while, contrary to general impression, the machinery and plant were mostly being kept in fairly good order, and this at considerable expense. I have read most exaggerated accounts of the wreck of the canal by the floods of the Chagres river. I have seen it stated that if a spectator were to take his stand on the isthmus and overlook some six or eight miles of the projected work, he would see nothing but immense masses of *débris* of gravel, earth, and sand washed down, and covered by the dense jungle which has sprung up. It was, of course, to be expected that, in a tropical country, after six years cessation of work, the excavated channel would be thickly overgrown, and much of the work done destroyed. But the general impression I gained from my visit was that a large amount of useful work remained accomplished—work not evident to the ordinary traveller or untrained observer. Still, the Chagres river and the Culebra cut appeared to me to be obstacles which may be considered insurmountable, that is to say, within the range of practical engineering.

Having no adequate supply of water at greater elevations to feed his canal, Lesseps depressed its bottom to a level that made it a constant prey to the Chagres river

and the enormous floods of water rushing down by that stream, which drains an area of some 1,400 square miles, discharging in the dry season, at its first point of contact with the line of the canal, 15 cubic metres of water, but



VIEW ON THE PANAMA CANAL.

in the wet season, 4,670 metres per second, cause a sudden rise in the Chagres river of from 20 to 50 feet in height![1] This water is precipitated from the steep

[1] In November, 1879, there was an unusual rainfall and flood of the river Chagres, stopping the railway traffic, the river rising over 40 feet, and covering the line in parts with more than 10 feet of water.

ravines and high mountains, the torrents concentrating suddenly, and often without warning, in the main outlet. I have seen a good deal of torrential streams in various tropical countries, and from my experience, both as an engineer and traveller, have learnt to appreciate their dangerous character, but nowhere—neither in Burmah, India, Indo-China, or South Africa, all of which I know well—have I seen anything more formidable than the Chagres river. The tropical rains in Central America are the most serious obstacle to the construction and maintenance of a canal, which must be out of reach of sudden and excessive inundations. This object could never be accomplished at Panama, with the channel bed at the sea-level. Neither is a lock canal, in my opinion, possible, for a canal with locks or lifts must have at its highest level an abundant, safe and controllable supply of water, and this can only be had in Central America on the Nicaragua route. There it already exists in perfection.

These facts regarding Panama clearly indicate the wide and radical difference in the conditions existing between that route and Nicaragua, and it is idle, as will later be more fully demonstrated, for the adverse critics of the projected canal to contend that the failure of the Panama scheme proved the impossibility of the Nicaraguan or any isthmian canal. That project was defeated by *local* difficulties, mainly by the uncontrolled giant floods of the Chagres river, which hold undisputed sway over this route, and by the Culebra cut, the character of which had never been properly ascertained.

The Tehuantepec Ship-Railway.

This project for a ship-railway across the isthmus at Tehuantepec, in Southern Mexico, was conceived and advocated with great energy and ability by Eads, who succeeded in converting to his view a large number of engineers and men of a scientific cast of mind in various parts of the world,[1] although he had the consensus of public opinion,—"the common-sense of mankind," as his opponents in the United States termed it,—opposed to him. With his death, however, the scheme fell out of favour, and no successor has taken his place. Eads was a man not only of commanding talents as an engineer, but of that rare class of resourceful, magnetic, persuasive personalities, equipped with boundless courage, vitality, and energy in face of all difficulties, of whom de Lesseps was such a striking example. Lesseps, it is too often forgotten, was not an engineer, either in the professional meaning of the word, or even in a much broader sense.

[1] The report of the House Committee on Commerce contained the following:

"In this connection, however, it is but proper to say that in the opinion of the most able and well-known engineers, naval architects, and ship-builders of the world, the construction of a ship-railway at Tehuantepec, in accordance with the plans which have been submitted to them by Mr. Eads, is entirely practicable. Indeed, many of these experts go much further than this, and declare that a railway is preferable to a canal;—first, in the economy with which it can be constructed; second, in the facility with which it may be enlarged when commerce demands its enlargement; third, in the economy with which it can be operated; and fourth, in its ability to transport vessels with greater rapidity and less delay."

His brilliant plan was to take ships bodily from one ocean to the other on a four-fold steel-laid track, drawn by as many locomotives abreast. The length of the line was to be 154 miles; the termini Salina Cruz, on the Pacific Ocean, and Barra, on the Gulf of Mexico; the maximum height to be crossed, 755 feet above sea-level. Extraordinary as was his proposed undertaking, it is by no means beyond the range of possibility, and has one great advantage, that of being built above the floods, while a canal must be beneath them. There is, in fact, at the present moment a similar ship-railway now in progress, and about three-fourths already built, though on a much smaller scale, it is true, which will probably pave the way for other works of a similar nature. This little-known work, the Chignecto ship-railway, connecting the navigation of the Bay of Fundy with the Gulf of St. Lawrence, is 17 miles in length, and will be capable of carrying ships weighing 2,000 tons.

The concession granted by the Government of Mexico to Eads was for a period of fourteen years from 6th May, 1881. The cost, estimated at £3,750,000 ($18,750,000), was to be refunded at the rate of £250,000 ($1,250,000) per annum, should the profits exceed £750,000 ($3,750,000) per annum. An ordinary railway, 190 miles in length,—planned by Eads to be used as a "service" line to aid in the construction of his ship-railway—has actually been carried out by the Mexican Government, and recently opened from ocean to ocean, though much is still wanting to make the line thoroughly serviceable. In order to render it valuable for the purposes of inter-oceanic railway

traffic it will be necessary not only to alter the character of the railway but to improve the two harbours. To complete all this will involve, it has been estimated, an expenditure of $8,000,000 (gold), and it is said that these improvements will be provided within the next three years.

When Eads, some sixteen years ago, had just completed his great work at the mouth of the Mississippi,[1]—which provided a splendid navigable channel for the largest ocean vessels,—standing one day on the last of the finished jetties with his assistant, Mr. Elmer L. Corthell, after gazing long across the Gulf, he exclaimed, "We must next discharge the commercial volume of the Mississippi into the Pacific Ocean." The last eight years of his life were given to the task of conceiving and perfecting the plans for his inter-oceanic ship-railway, and

[1] The channel of the Mississippi, below New Orleans, was seriously obstructed, especially by the bars at its mouth, and a commission of army engineers had recommended that a canal should be built, by which the bar would be avoided. Eads vigorously opposed this plan and undertook to increase the depth of the channel in the south-west pass (then only 14 feet) to 30 feet, and thus to maintain an open mouth for the river. This he proposed to do by the "jetty system," engaging not to demand any pay for the services of himself and his associates until a stable depth of 20 feet should have been secured. He was required to apply his system to the south pass, which had two bars, with depths of 8 and 14 feet respectively. In the course of five years he here created a channel 200 feet wide and 26 feet deep, with a central depth of not less than 30 feet, which has since been maintained at a moderate expense in excellent condition. Eads also advocated the application of his jetty system to the improvement of the Mississippi channel as far north as St. Louis, believing that by securing a fixed width a uniformity of depth could also be maintained.

of convincing the world of its feasibility, and had he lived I am inclined to think that he would have carried out this great work.

The Nicaragua Route.

In all the investigations undertaken of late years, both by officials and private individuals, the part taken by the United States has been most prominent. The American Government has from time to time despatched to the isthmus many exploring expeditions, the results of which have been duly presented in that admirable form so characteristic of the American "Memoirs of Surveys of States."

The canal follows what is known as the "Nicaragua route," which, according to the official report, submitted to the President of the United States on February 7th, 1876, "begins on the Atlantic side, at or near Greytown, runs by canal to the San Juan river, thence follows its left bank to the mouth of the San Carlos river, at which point navigation of the San Juan river begins, and by the aid of three short canals of the aggregate length of 3·5 miles, reaches Lake Nicaragua; from thence across the Lake and through the valleys of the Rio del Medio and the Rio Grande, to what is known as the port of Brito, on the Pacific coast. It possesses, both for the construction and maintenance of a canal, greater advantages, and offers fewer difficulties from engineering, commercial, and economic points of view, than any of the other routes shown to be practicable by surveys



GENERAL MAP OF ENTIRE



ROM OCEAN TO OCEAN.

sufficiently in detail to enable a judgment to be formed of their relative merits." This opinion, based upon a long and careful study of the several route-surveys across the continent, was signed by General Humphries (Chief of Engineers), Mr. Patterson (Superintendent of Coast Survey), and Commodore Ammen (Chief of Bureau of Navigation).[1]

Mr. Menocal's connection with the canal project has

[1] In reply to a statement made by the "Railroad Gazette," that one unfavourable report "seems to have been considered unsuitable for distribution, and the apparent reason for so considering it was the excess of some of the estimates over those made by the engineers of the promoters," Mr. Menocal replied:

"I have always tried to keep myself posted in matters relating to this project, but I must admit that on this point my information is deficient. I have no knowledge of such a document.

"Major W. McFarland (of the Corps of Engineers), Prof. Henry Mitchell (of the Coast Survey), and General Jacob Ammen, all submitted reports to the International Canal Commissioner of the results of an examination made in 1874 of the Nicaragua and Darien routes, and these reports were transmitted to the President of the United States on the 7th of February, 1876, but none of the documents in question within my knowledge have ever been published. . . . The Senate has recently called upon the Secretary of War for a copy of the missing, or so-called 'suppressed' documents, and I trust they will be unearthed. I know that General Humphries and Admiral Ammen, both members of the Commission, made earnest efforts to procure a publication of all the manuscript inclosures, but while the original report of the Commission was in 1879 still preserved, none of the subordinate reports could be found, nor does a copy appear to have been filed in the Engineering Bureau. But none of these papers would have been of any special value. . . . The present is almost entirely a new project, and the estimates are made in the light of experience gained in twenty years, and through the expenditures for new surveys of nearly half a million dollars, and in construction of several millions more."

been very intimate for the past twenty-four years, and his name will for ever be associated with the enterprise. On each occasion that the United States Government, either directly or indirectly, have taken action in the matter, Mr. Menocal has been the engineer selected for the work. In 1871-73 the route was explored and reported on by Commander Lull, assisted by Mr. Menocal. Appointed civil engineer in the United States Navy in 1874, and next year chief engineer of an expedition to survey a canal route, in 1876 and 1877 Mr. Menocal was employed by the Government of Nicaragua with the consent of the Secretary of the United States Navy, in surveying the San Juan river and the harbour at Greytown, with a view to their improvement; in 1878, in conjunction with Admiral Ammen, he was appointed to attend the Inter-Oceanic Canal Congress, which assembled at Paris on the 15th of May, 1879, when Lesseps spoke well of the route and of Mr. Menocal's work.[1] The records of that convention attest the fact that Mr. Menocal called special attention to the immense floods of the Chagres river, and the damage these would do to the proposed tidal canal. In 1885 he executed a thorough examination and location of the entire canal

[1] "Sept ou huit auteurs, et parmi eux MM. Lull, Menocal, Blanchet ont produit au Congrès des projets qui empruntaient la route du Nicaragua. Le point est, en effet, des plus favorables."—Vol. i., p. 462.

"Les Américains par l'organe de l'Amiral Ammen, se sont montrés particulièrement favorables à ce tracé. C'est d'ailleurs à l'un de leurs ingénieurs, M. Menocal, qu'on doit le projet, admirablement conçu et étudié, du canal éclusé."—LESSEPS, *Souvenirs de Quarante Ans*, vol. i., p. 464.

route, submitting to the United States Government a very full and exhaustive report; and it is upon this survey that all latter proposals in connection with this project have been based. In 1887 he obtained the concession from the Republic of Nicaragua, and in that year re-located the entire line.

It will be seen that Mr. Menocal's labours have been not only those of engineer, but of negotiator and diplomatist. And there can be no doubt that his work in the latter field, as in the former, has been performed with great ability. A Cuban by birth, he was admirably fitted for a mission requiring intimate knowledge of the Spanish-American character, and of the Spanish language, and great tact and *finesse* in dealing with the authorities.

Before proceeding to a description of the route it may be noted that the greatest obstacles met with in other localities are: (1) high elevations in the Cordillera separating the two oceans, requiring tunnelling; or (2) a high summit level requiring a large number of locks for which an adequate water supply is not obtainable; or (3) torrential streams whose control within economical limits defies the skill of the engineer.

Nicaragua is free from all these obstacles.

Chapter II.

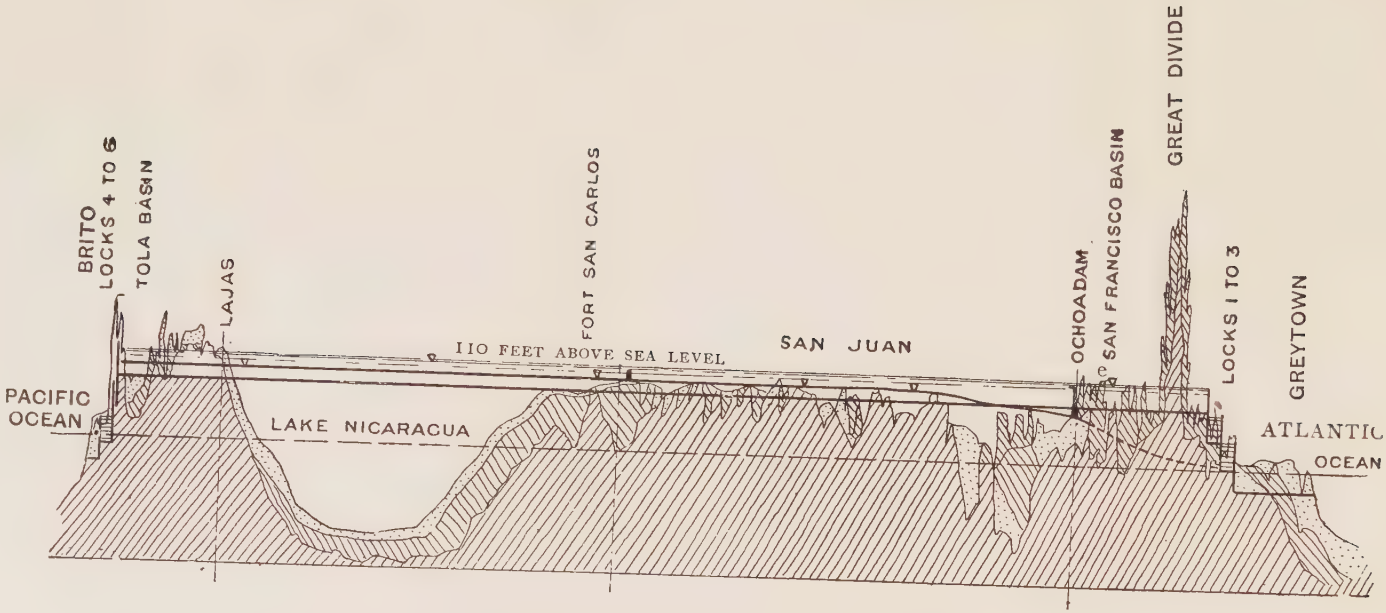
THE CANAL ROUTE.

Concessions and Companies.

THE proposed route is from Greytown (San Juan del Norte), on the Atlantic, to Brito, on the Pacific, the total distance from port to port being under 170 miles, of which about twenty-seven miles will be excavated canal. Lake Nicaragua, necessarily the summit level of the canal, will be connected with the Pacific by two sections of canal in excavation, and by the Tola basin, and with the Atlantic by slack-water navigation through the valley of the river San Juan, and a series of basins in the valleys of the San Francisco and Deseado, connected by short sections of canal. The sea level on each side is reached by three locks, which have been located as near as possible to the extremities of the canal—namely, $2\frac{1}{2}$ miles from Brito, and $12\frac{3}{4}$ miles from Greytown—thereby giving a clear summit level of 154 miles in extent out of the total length.

The Lake.

The lake, over 105 miles in length, with an average of some forty miles in width, is the controlling feature of the



LONGITUDINAL SECTION OF THE NICARAGUA CANAL.

whole problem. It has a watershed of about 8,000 square miles, of which its water area is nearly one half, and on account of its large space, restricted catchment basin, and ample outlet, is not subject to either sudden or great fluctuation in level. Both the lake and the San Juan river are therefore free from floods, a most important feature, distinguishing this route from all others. The average yearly rise and fall, due to wet and dry seasons, is about 5 feet, its highest water-mark being 110 feet above the sea, the elevation assumed for the highest level.

A direct sailing line between the outlet at Fort San Carlos, on the eastern shore, and the mouth of the river Lajas on the west—a distance of 56½ miles—comprises the lake navigation proper, and here the 30 feet contour (below the assumed level) is met with about fourteen miles from the outlet, and 1,200 feet from the western shore. Between those points the depth gradually increases to 150 feet or more, the free navigable portions comprising the greater part of the lake area. Dredging in mud to an average depth of 9 feet will be required for the fourteen miles on the east, and rock-blasting and dredging in the 1,200 feet near the west shore. The eastern side of the lake being sheltered from the prevailing north-east winds, no provision is needed there to protect the channel. The western shore is exposed to the prevailing winds and waves, and the canal entrance there must be protected by two piers, projecting to deep water in the lake, to be made of crib, for which the native hard wood is well suited, filled with stone from the excavations.



1. Managua. 2. Brito. 3. Granada. 4. San Carlos. 5. River San Juan. 6. Ochoa Dam. 7. Greytown.

BIRD'S-EYE VIEW OF THE NICARAGUA CANAL.

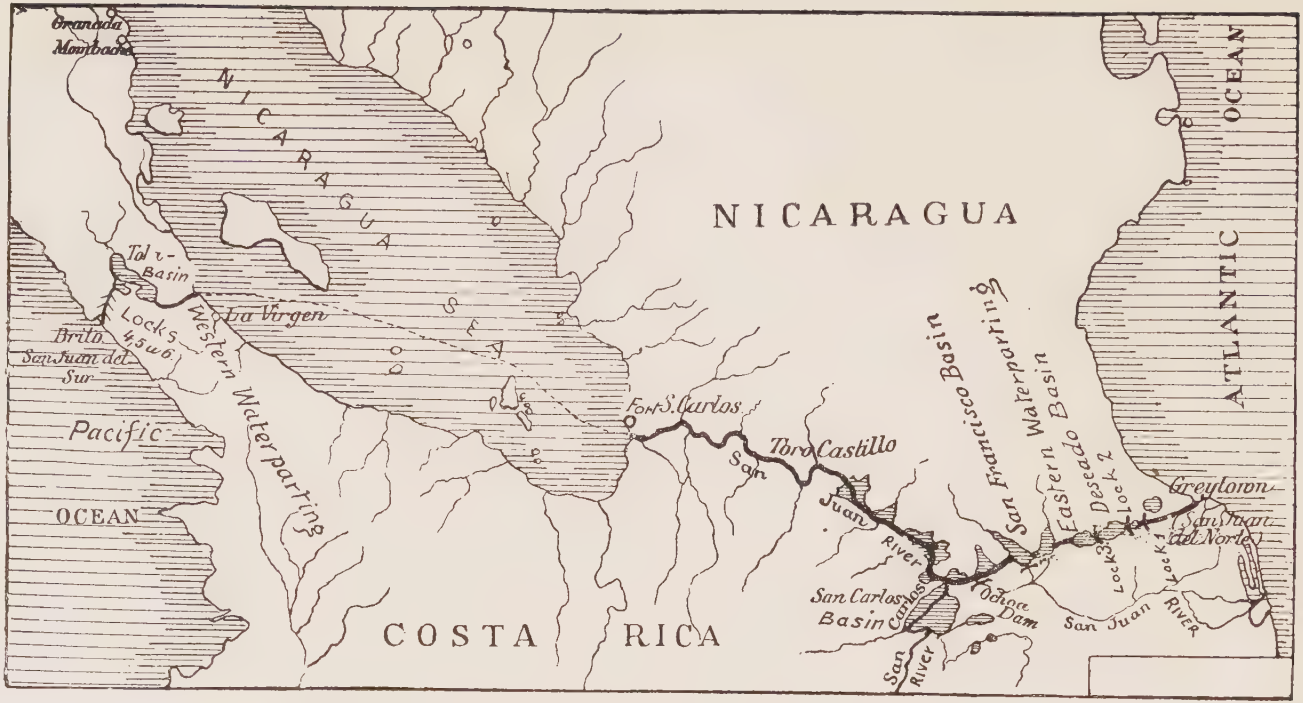
In the discussion on the bills in the late Congress, attention was drawn to the dangerous character of Lake Nicaragua, with a view to showing that insufficient allowance had been made in the estimates for safe and commodious harbours. Two accounts of travel in Nicaragua were quoted, giving descriptions of the lake which seem to me to be altogether exaggerated.[1] The fears expressed as to the dangers of navigation are unwarranted, so far as I could ascertain, and the arrangements proposed for harbours and lighting at the two termini on the lake appear to be sufficient.

The Eastern Section.

Taking its source at the south-eastern extremity of the lake, the San Juan river flows some 119 miles through a broad valley, almost due east, to its mouth south of Greytown. Its minimum flow is 12,000 cubic feet per second, the width varying from 800 to 2,000 feet, and the average fall being 11 inches per mile.

From the lake eastward the San Juan will be made

[1] The following passage was not quoted :—"I think I realized the idea of 'mountain waves' more thoroughly on Lake Nicaragua than ever I did in an ocean storm. Not, of course, that their size could be compared, but they towered so mightily overhead and shut us in so darkly. After a voyage of eight hours, as weary and trying as could be wished to test one's nerves, we made the pier at Virgin Bay, when the crowd who had been watching rushed into the arms of our dripping crew, to congratulate them on their escape. Decidedly I hold Captain Pim right in saying that a sailor of the sea had better cruise for a week on Lake Nicaragua before expressing contempt for the sailor of fresh water."—*A Ride across a Continent*, Frederick Boyle, vol. ii., p. 105.

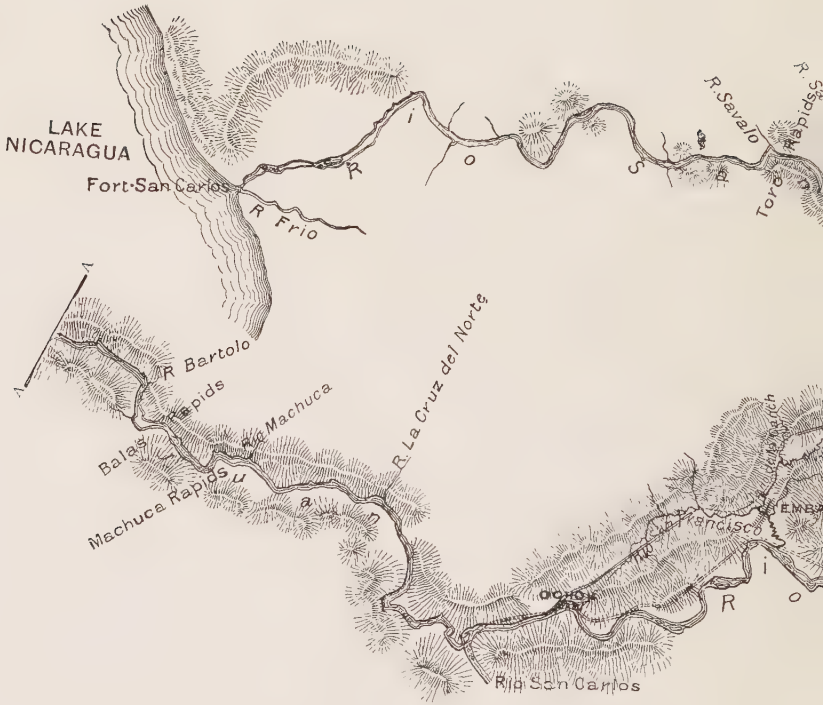


SKETCH MAP OF CANAL ROUTE.

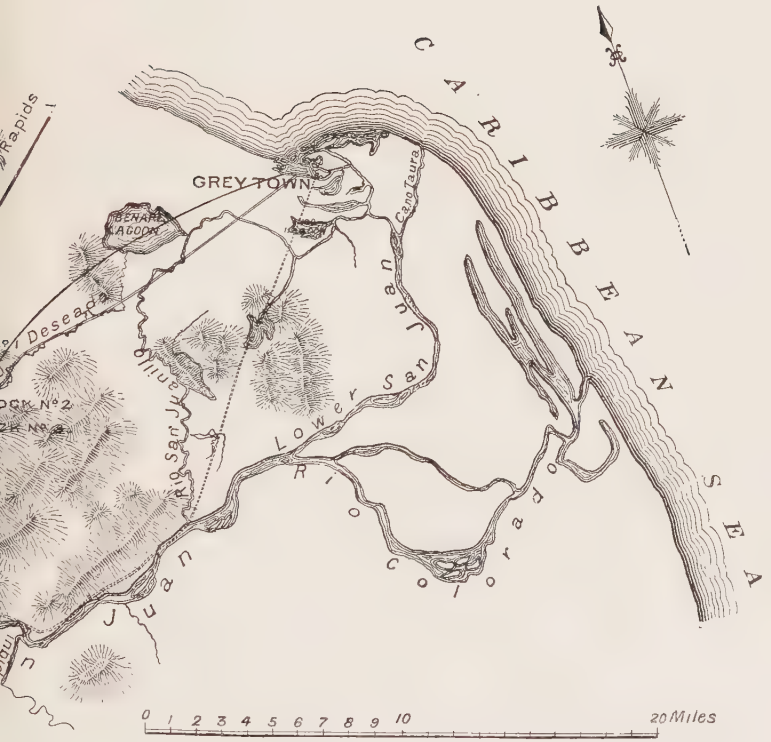
navigable for a distance of 64·5 miles by the erection of a dam at Ochoa, and by dredging for the first 28 miles below the lake, rock-blasting also being needed for a short distance at Toro rapids. The dam at Ochoa, which will there raise the water 56 feet, will be 1,250 feet on the crest and 1,900 feet between abutments, with a maximum height of 70 feet. The river in its natural course, from the lake to the Atlantic, has (as mentioned) an average fall of 11 inches per mile, but the slope is not uniform, there being rapids at Toro, Castillo, and Machuca, with an aggregate fall of about 20 feet in the total distance of not more than $2\frac{1}{2}$ miles, the fall at Castillo being $4\frac{1}{2}$ feet in a space of 1,000 feet; on the other hand, between the lake and Toro, and for 15 miles below Machuca, the fall is not more than 1 inch per mile. The rapids at Toro, where the first rock ledge across the river is met with, form the natural weir which maintains the present lake level, the crest being 9 feet above the proposed bottom of the navigable channel. At Castillo, five miles lower, where the barrier is 7 feet lower, 3 feet of rock excavation for a short distance will be needed; and over the present Machuca rapids,[1] 12 miles below, the depth of

[1] The rapids of the Machuca, according to Squier, are the longest, and in many respects the worst, on the river. "They are not far from half a mile in length; the river here is spread over a wide, rocky, and crooked bed, with large rocks projecting above the surface of the stream, between which the water rushes with the greatest velocity. They are considered dangerous by the native boatmen."

Of the other rapids he says: — "About three miles above the Machuca Rapids are the Rapids of Mico and Los Valos, which however



EASTERN DIVISION.—GR



TO LAKE NICARAGUA.

water as raised by the dam will be not less than 34 feet. Between the lake and Toro dredging to an average depth of 4½ feet will be required throughout an aggregate distance of 24 miles, the material to be removed being gravel, clay, and loose stones. Below Toro no excavation will be needed in the bed of the river, except at Castillo. Between the rapids the depth of water attained will vary from 30 to 40 feet, and from Machuca to the dam from 60 to 130 feet. The width of the navigable channel where no excavation is required will average 1,000 feet, and in excavation 125 feet at the bottom. The surface width will at no point be less than 1,200 feet, expanding in places to 2,500 between the banks, and in the flooded adjacent valleys to one mile or more. A fall of three-fourths of an inch to the mile has been allowed from the lake to the dam as the necessary slope to discharge the surplus waters, and, consequently, the level of the river at the dam is estimated at 106 feet above sea level, or 4 feet below the lake. For the purpose of navigation, however, that portion of the river may be re-

are close together, and may be regarded as one. Still above these are the Rapids of the Castillo. For the whole distance between the Machuca and the Castillo, the banks of the river are rocky; the bottom is also rough and rocky. The depth is very uneven, varying from 5 to 20 feet within the space of hardly as many rods. The current is rapid, and all upward navigation difficult. The Rapids of the Castillo are the shortest of the series, and almost deserve the name of falls. Here considerable ridges come down to the river on either side. The rapids, without artificial modifications, would present nearly an insuperable obstacle to all kinds of navigation deserving the name. Five miles above the Castillo are the Rapides del Toro. The banks are firm and high."—Vol. ii. p. 223.

garded as an extension of the lake, in which the maximum current will probably never exceed half a mile an hour.

A work of some magnitude, but presenting no unusual difficulty, is the rock-blasting under water at Castillo and Toro rapids (amounting to about 400,000 cubic yards), the quantity to be determined by the side slopes found necessary. This work can be more economically done before the water is raised to the assumed summit level, but not before the lower section of the river has been raised by the Ochoa dam to the level of the upper rapids. Otherwise, the excavation in the upper rock ledge might cause an undue fall in the lake level, which would greatly interfere with navigation and the progress of the works in river and lake.

The San Carlos.

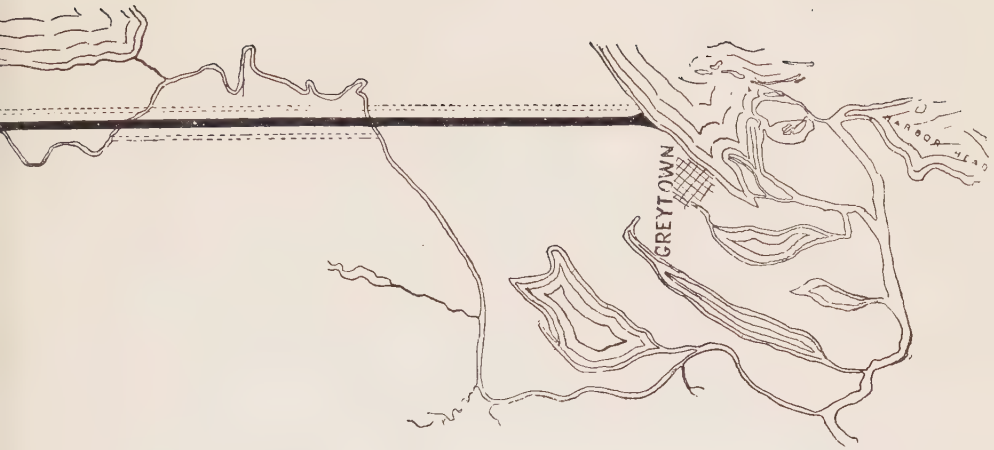
A short distance above the dam the river San Carlos debouches into the San Juan from the south. This stream drains a large area in Costa Rica and possesses in a marked degree the general characteristics of a tropical torrential river; namely, extreme fluctuations in volume, from a nearly dry bed, with barely enough water to float a canoe, to a discharge of, possibly, 3,000 cubit feet per second. Its upper channel and tributaries, confined by high banks, and flowing from mountain slopes, gradually broaden and flatten as they approach the lowlands near the San Juan, and the flanking hills recede from the banks, so that, for a few miles above the confluence, the San Carlos flows through a wide valley, elevated but a



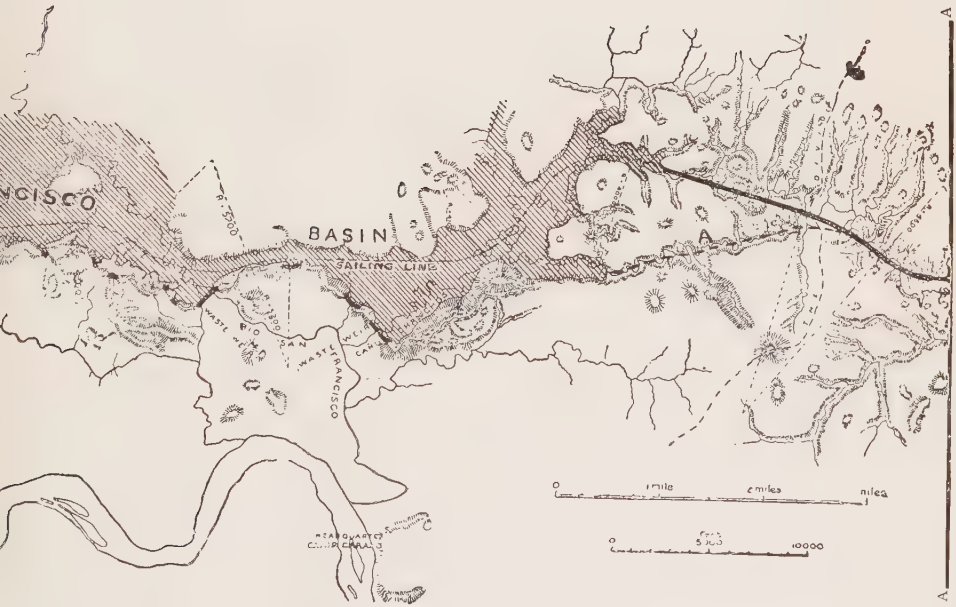
EASTERN SECTION.—FROM



EASTERN SECTION.—FROM TH



VN TO THE DESEADO BASIN.



O BASIN TO THE OCHOA DAM.

few feet above the bed of the stream. This valley will be flooded to the same level as the San Juan (106 feet), and thus converted into a large artificial lake, constituting a part of the summit level of the canal, navigable for some twenty miles towards the Costa Rica capital. The San Carlos, the only sand-bearing stream emptying into the waters of the canal, will discharge into this still water basin, at a point some twenty miles distant from the nearest part of the canal navigation, and will deposit all the heavier sand and silt, now brought from the highlands by the rapid current. The lighter material held in suspension will be carried along with the slowly-moving current, which will always seek the nearest outlet, and be discharged over the vast weirs to be built in the confining ridge several miles south of the San Juan, and will, therefore, not reach the channel of the latter stream. The lower part of the valley of the San Carlos will be flooded to a width of from one to two miles, and to a depth of 60 feet. It will require a long term of years to fill this basin so as to encroach on the canal navigation. When that time does come, the San Carlos waters can, if desired, be diverted entirely by throwing an embankment across the valley and discharging the waters over the weirs previously built, and through existing watercourses, into the San Juan far below Ochoa.

The confining ridge to the east of the valley extends from the south abutment of the proposed dam in a southerly direction for a distance of ten miles to the foot of the high mountains of the interior of Costa Rica. There are, however, several depressions in which the

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ground falls below the contour 114, adopted as top of the confining barrier. These gaps will be closed by embankments, seven of which will be built wholly above the normal water level in the basin, eleven will have an average height of 21 feet, and two of 50 feet, with an aggregate base length of 130 feet, the total length of embankments on crest being 5,893 feet.

The San Francisco.

The canal, as it leaves the river channel a short distance above the Ochoa dam, is located in the lower valley of the Machado Creek. Continuing easterly, it will cross the ridge dividing the valley of the Machado from a swampy region known as the Florida Lagoon. Crossing the latter by a short cut, it enters the valley of the San Francisco; and, skirting some foot-hills to the south, follows the Chanchos stream to its junction with the Limpio, and thence *viâ* the valley of the latter to the foot of the dividing ridge. An examination of the plan is necessary to a clear idea of the topographical conditions.

It will be observed that the canal traverses four adjacent valleys. The Florida Lagoon drains into the basin of the San Juan by a small watercourse, the Danta; the San Francisco valley by the stream of the same name; and the Limpio and Chanchos by the Chanchos brook falling into the San Francisco (the latter, as well as the Danta and Machado, being tributaries of the San Juan). All these valleys are to be converted into large, deep, navigable basins by extending through them the summit level

from Ochoa. Their outlets must therefore be closed by embankments; and the foot-hills, wherever their crests fall below the contour 114, must be raised to that level. The main embankments will have to sustain a water pressure of about 60 feet, the level of the valleys being about 46 feet above the sea. Six embankments will have an aggregate base length of 3,440 feet, and along the crest of 13,685 feet. These closing gaps in the chains vary considerably in height, many of them being wholly above the ordinary water level in the basin—*i.e.*, from 1 to 8 feet high—while other gaps require embankments of much greater height. They are sixty-one in number, with a total length on the crest of 17,835 feet.

Several important advantages are gained by this treatment.[1] The total length of basin created is 11·267 miles,

[1] Major Dutton says: "These valleys are very numerous and intricate. But it is essential to note here as a highly important fact that none of them on the north side of the river have large drainage basins; but all, with a single exception, drain directly to the river in numberless small streams, without uniting their waters to form considerable rivers. The exception is the San Francisco basin, whose waters drain into the San Juan; but even this tributary has a comparatively small watershed. Mr. Menocal proposed to solve all difficulties of this kind by converting a great part of the San Francisco drainage basin into a lake at summit level by means of embankments. The first reconnaissances seem to indicate a fortunate fitness in the topography of the basin for this project, and subsequent careful and systematic surveys have confirmed and established that impression. The project carried with it the necessity of opening a profound cut in the eastern rim of the San Francisco basin, which has received the name of the 'divide cut.' This is a work of vast magnitude and corresponding expense. But it has the merit of affording a complete solution of all other engineering difficulties, and

of which 8·697 miles will have a water depth varying from 30 to 60 feet. In other words, of the 12½ miles from the bank of the river San Juan to the deep cut to the eastward of this section, but 1·233 miles will be wholly, and 2·570 miles partly, in excavation. The economy, however, is not confined to the saving in excavation, against which must, of course, be charged the cost of the embankments, but consists principally in the enormous saving in the deep rock excavation, and in the valley of the Deseado beyond, by carrying the summit level through into the valley of the stream. The increased cost resulting from the adoption of a much lower level would have been so great as to seriously handicap the undertaking financially. The gain in facilities of navigating and maintaining the canal is also important, for through wide and deep basins vessels can move at full speed, lie at anchor, or pass each other at all points, while in the restricted channel the position and speed of ships must conform to rigid regulations.

At one time it was intended to utilize the whole length of the San Juan river from the lake to the Atlantic. But it was found, that while the river can be effectively utilized and handled from the point where it leaves the lake to the proposed junction of the canal with the river at the Ochoa dam, below that the river would be very difficult to deal with.[1]

insuring the permanence of the entire line against the destructive action of natural forces."

[1] Mr. Menocal says:—"A low level route from Ochoa to the Atlantic would be longer by about 12 miles, and wholly in excavation.

On account of the shifting character of the channels, and the large amount of silt precipitated into the river by the San Carlos stream, it would be almost impossible to utilize the river on this portion as a channel, and even then it is very doubtful whether permanency could be obtained. I have met engineers in the United States

In order to avoid the high ridges and projecting spurs, it must keep close to the banks of, and be but a little elevated above, the San Juan. The canal would therefore be in constant danger of destruction,—on the south by the river floods, and on the north by the accumulated drainage of an extensive watershed, — presenting at all points complicated engineering problems of most difficult solution. By the high-level plan, the largest portion of that watershed is eliminated; and, of the balance yet affecting the canal, a large area is converted into extensive reservoirs, from which the surplus waters can, without difficulty, be discharged over waste weirs on the confining ridges into the low valley on the south, and through the numerous watercourses traversing the same into the San Juan."

Major Dutton says:—"In searching for a route from this critical point to the sea, the earlier surveys disclosed clearly the fact that the southern side of the lower San Juan was impracticable, (1) by reason of the great amount of excavation required; (2) by reason of the many sharp turns, embarrassing to vessels of great size; (3) by reason of the gigantic cost of opening and maintaining a harbour; and 4th and most conclusive of all, the certainty of speedy breaches of the canal by the overwhelming floods of lateral tributaries which the line of the canal must cross. The north side of the river alone offered promises of feasibility. The doubtful feature was the San Francisco river. This stream drains an area on the north side of the San Juan which, in an ordinary country, would not be regarded as large, but which, in view of the excessive rainfall of this locality, was sufficiently large to be very menacing. In dry weather the stream is navigable only by small skiffs; in wet weather it is a powerful stream. It would be extremely dangerous to a location near the river and parallel to it. Such a location, moreover, would involve very formidable excavations and conservative works for a considerable distance below the San Carlos."

who have maintained the entire feasibility of utilizing the river throughout. But I am of opinion, from what I have seen of similar problems in various parts of the world, but more especially in tropical countries, where all the conditions were similar, that engineering skill, at any reasonable cost, could not control the lower section of the San Juan river through its reaches of sandy flats below the line of the foot-hills. The adoption of the particular line chosen by Mr. Menocal is not only much shorter and less costly, it is necessary for the safety of the canal.

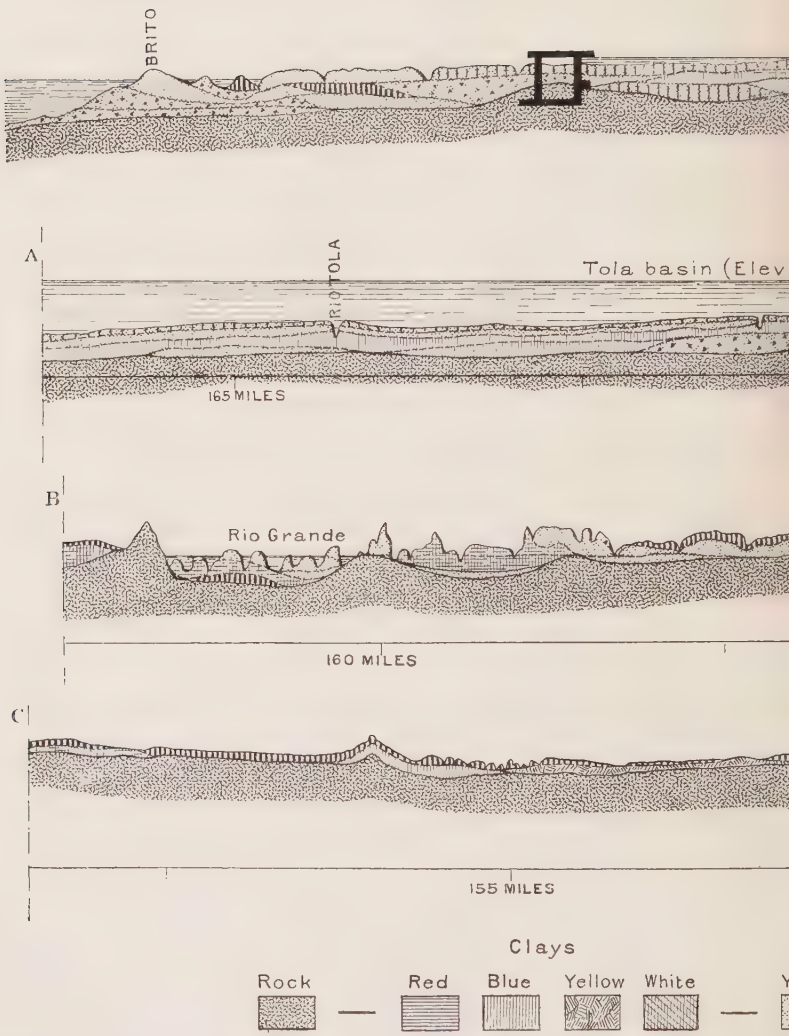
The Western Section.

While the isthmus separating the lake from the Pacific is, at its narrowest point (where is found the very lowest depression in the whole Cordillera), not more than 12 miles in width, the most economical route connecting the lake shore with Brito has a length of 17·04 miles. It starts from the mouth of the Lajas, a small stream draining a limited watershed to the south of the line, and trends south-westerly through a broad valley slightly rising towards the "Divide," which it reaches at a distance of 4·70 miles from the lake. Descending thence on the Pacific Slope, at the rate of about 9 feet per mile, at a further distance of $1\frac{3}{4}$ miles it falls into the narrow, tortuous valley of the Grande, a waterless creek during the dry season, but a stream of considerable flow in the rainy portion of the year. Its maximum volume has been estimated as high as 10,000 cubic feet per second; but this is attained only in times of extra-

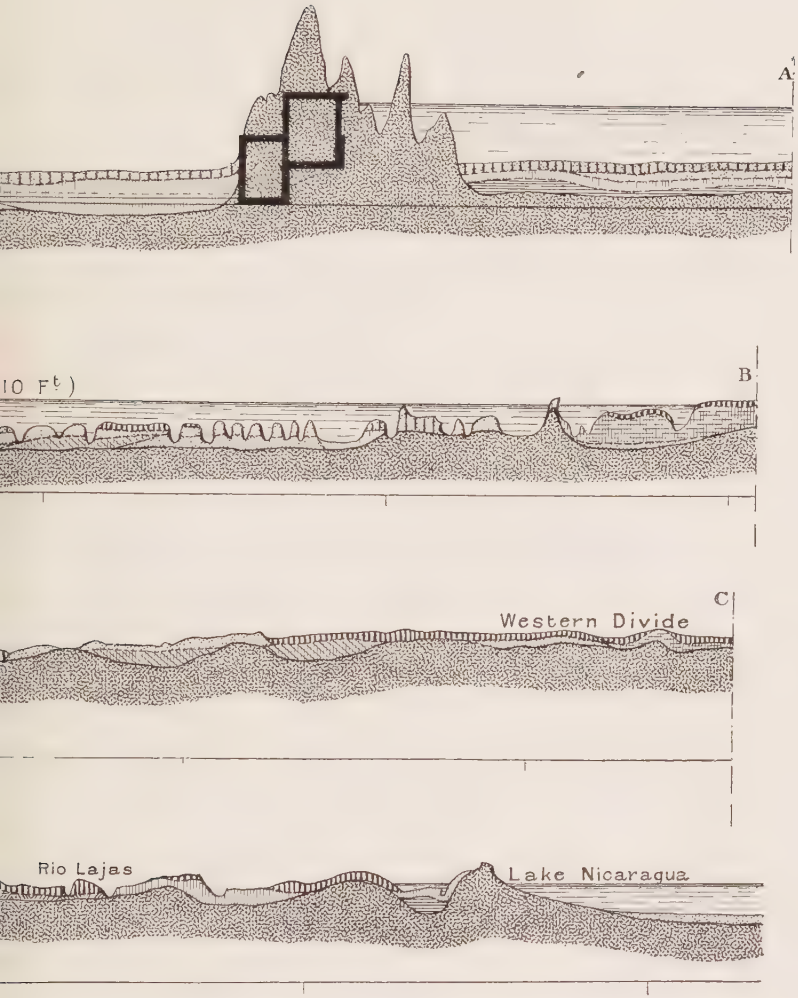


THE WESTERN SECTION, FROM LAKE NICARAGUA TO PACIFIC OCEAN.

ordinary precipitation. In this narrow valley, confined by spurs of considerable elevation, projecting from the highlands on both sides, there is not room for the canal and for an independent channel for the stream. A very favourable location has been made for the former, and it will be shown later on what disposition is proposed to be made of the stream. In $1\frac{1}{2}$ miles the Grande makes a detour to the westward ; and the canal, free from the confining hills on the north, cuts across a broad valley to fall again into the stream at a distance of 9 miles from the lake. At this point the surface of the ground is 30 feet below the assumed level of the lake. The valley continues its uniform descent of about 8 feet to the mile, and gradually expands until, at the junction of the Tola tributary, it attains the maximum width of 12,500 feet. At the fourteenth mile-post, near a place called La Flor, the Grande passes through a narrow gap, flanked by high hills, into the more extensive plain of Brito, bordering on the Pacific. It was the original plan to cut a canal through this valley of Tola, and four locks were contemplated ; but another scheme has since been adopted by which the valley in question is flooded and converted into an extensive navigable reservoir. This will be accomplished by closing the gap at La Flor by a dam 1,800 feet long and 70 feet high, so forming a basin, whose surface level will be the same as that of the lake, in fact, forming a part of it. It will be 5·60 miles long on the sailing line, with a depth of water varying from 30 to 70 feet, and a superficial area of 4,000 acres. The advantage gained by this plan consists not so much in saving canal excava-



LONGITUDINAL SECTION OF WEST



ION.—LAKE NICARAGUA TO BRITO.

tion for a distance of over $5\frac{1}{2}$ miles (which is partly counterbalanced by the cost of the dam), as in the increased facilities offered to traffic by the large, deep, and safe inner harbour, within three miles from the Pacific port, where ships can lie at anchor, or pass each other with safety and freedom when moving in opposite directions. A better control and disposal of the surface drainage is also provided by this treatment. Two locks will be placed at the western end of the dam, by whose combined lift the level of the water will be lowered 85 feet (namely, from 110 feet above sea level to 25 feet), and from this point the canal route traverses the valley of Brito (a distance of 1·58 miles), to Lock No. 6, where the last descent of 25 feet is made to sea level, which, as a tide of 8 feet must be provided for, will have a variable lift of 21 to 29 feet. From this last lock to the harbour there will be about half a mile of canal, but the section has been so enlarged as to make that portion of the water-way an extension of the harbour itself.

THE CONCESSIONS, MARITIME CANAL AND CONSTRUCTION COMPANIES.

Concession from Nicaragua and Final Survey.

It is needless to recapitulate the many steps—political, financial, engineering — taken from 1876 to October, 1886, when an association of prominent individuals in the United States was organized to obtain, *inter alia*, a concession from the Republic of Nicaragua

(ratified on April 25th, 1887),[1] and to affect the incorporation and organization of such companies as should be found necessary to carry forward the canal enterprise to its consummation. A treaty, known as the Frelinghuysen-Zavala treaty,[2] had been negotiated in 1884 between the United States and Nicaragua, under the terms of which the canal was to be built by the United States. But when Mr. Cleveland became President in 1885, while it was pending in the Senate, he withdrew it, not from opposition to its general purposes, but, to quote the words used by him in his annual message of December, 1885, because it was "coupled with absolute and unlimited engagements to defend the territorial integrity of the States where such interests lie." This clause was held by him to be an "entangling alliance," inconsistent with the declared public policy of the United States. It was this objection which led to the concessions of Nicaragua and Costa Rica to *private persons* and the incorporation by the United States of the Maritime Canal Company of Nicaragua. In November, 1887, the association in question despatched an engineering expedition, with Mr. Menocal as its chief, for the purpose of making the final surveys and location of the canal. The entire route was re-located, and exact data obtained, upon which was based an exhaustive estimate of its character and cost. To demonstrate the thorough nature of this investigation, it is sufficient to mention the fact that, although the length of artificial canal is less than twenty miles, the total distance actually surveyed by transit and level—in

[1] *Vide* Appendix No. IV.

[2] *Vide* Appendix No. III.

cross-sectioning, and the location of locks, dams, embankments, railroads, flowage-lines, etc.—through a most difficult country,[1] was not less than 4,000! At every 500 yards careful borings with corresponding records were made. The whole constituted an accumulation of scientific data probably unsurpassed in any other similar enterprise.

The Maritime Canal Company.

On January 10th, 1888, Senator Edmunds introduced a bill in the United States Senate for the incorporation of the Maritime Canal Company of Nicaragua, a similar one being introduced by Mr. Norwood in the House of Representatives. During its progress a concession from the Republic of Costa Rica[2] was deemed advisable, was negotiated, and duly ratified on August 9th, 1888, the Bill, in its final shape, approved of by the President, becoming law on February 20th, 1889.[3]

On May 9th, 1889, the Maritime Canal Company of Nicaragua was organized with a capital of £30,000,000 ($150,000,000) in five per cent. bonds and £20,000,000 ($100,000,000) in ordinary stock. Its charter being granted by Congress, it assumed in a certain sense a

[1] The survey was over ground alternately swampy and hilly, and covered with a dense vegetation, through which every foot of the trail had to be cut with a *machete*, and where travelling was fatiguing in the extreme, officers and men being compelled in many instances to go long distances buried to the waist in the mud and water, with a very uncertain bottom to stand upon.

[2] *Vide* Appendix No. V.

[3] *Vide* Appendix No. VI.

national character, for it must be borne in mind that companies formed in the United States are usually merely locally chartered by the various States. The Union Pacific Railroad, the first trans-continental line in the States, is in fact the only other instance of a similar distinction. Meanwhile the association had caused to be incorporated a Construction Company, and in March, 1890, the Hon. Warner Miller was elected its president. On the 8th of June, a construction party of forty-seven engineers and their assistants arrived at San Juan del Norte (Greytown) and at once commenced work on the canal.

The Construction Company.

The capital of the Construction Company, £2,400,000 ($12,000,000), divided into 120,000 shares of $100 each, was placed on the average basis of fifty cents. on the dollar, yielding, say, £1,200,000 ($6,000,000), which has been expended in actual work, materials, and plant, the exhaustive surveys alone costing a very large sum. Among the assets is a railroad eleven miles in length,—from Greytown to the "Great Divide,"—laid down to facilitate the carriage of plant and machinery for the attack of that most difficult portion of the work, upon the completion of which will hinge the opening of the canal. Various Nicaraguan government officials, charged with the duties under the concessions granted, inspected the work done, and certified that there was value on the ground for the full amount which had been expended.

The work accomplished, up to 1893, when the work was suspended, according to the official statement was as follows:

A thorough survey and definite location of the canal route has been made. The data accumulated by extensive cross-sectioning and careful subterranean explorations with the diamond drill, and the maps, profiles and plans based thereon, are complete and of great value. At Greytown, 1,000 feet of breakwater has been constructed, and a practical demonstration has been secured thereby of the efficacy of the plan proposed for the restoration of the harbour whenever the breakwater shall be extended to the limit required. There have been constructed at Greytown wharves and warehouses, with proper landing facilities, permanent buildings for officers' quarters, storehouses and workshops equipped with tools and machinery. A valuable and powerful dredging plant, consisting of dredges, tug-boats, lighters, launches, and all the necessary accessories, has been acquired. The Pellas franchise and plant (machines, five steamers, and some other material), for exclusive navigation of the San Juan river and Lake Nicaragua, have been purchased. Close on a mile of canal has been excavated to a depth of 17 feet, and to a width varying from 100 to 230 feet. Eleven miles of railroad have been constructed along the line of the canal and equipped for construction work. The survey and location of the line for all the railway requisite for the completion of the work has been completed. Sixty miles of telegraph line, providing communication with all points where work may be

in progress, have been built, and the canal line for a distance of twenty miles has been cleared of timber. Careful explorations have been made of all the sites proposed for the location of the locks and of the large dams. A new survey and estimate has been completed of the canal proposed to connect Lakes Nicaragua and Managua, and much other work has been accomplished necessary to a successful issue of the enterprise.

I will add that while on the ground I satisfied myself that this statement may be regarded as reliable.

Cessation of the Construction Company and Reconstruction.

When the disastrous financial panic of 1893—the culmination of the disturbance which began in the Argentine, extended to Australia, and thence to Europe—overtook the United States, Mr. Miller and his colleagues found it impossible to carry on the work of the Construction Company, and for the protection of all concerned it was placed, by order of the courts in America, in the hands of a receiver, whose functions, it is important to note, apply to the Construction Company only, the rights and charter of the Maritime Canal Company remaining unaffected. Simultaneously a scheme of reconstruction was framed, and a committee, of which Mr. J. R. Bartlett is chairman, was created, with the object of reconstructing the Construction Company. The committee awaits, no doubt with considerable anxiety, the final result of the bills being presented to Congress, and the action of the

United States Government. European capitalists were said to be pressing in their offers of money. The whole scheme of the canal was to be submitted, so the Construction Company stated late in 1894, to a committee of leading European engineers, financiers, and shipowners, whose report would form the basis, it was said, on which a public subscription for a certain proportion of the required capital (possibly the £6,000,000 ($30,000,000) unguaranteed) might be invited in Europe and America. Such a report, it is self-evident, would tend to stimulate public opinion in the States very considerably, and presumably to affect the decision of Congress and of the United States Government. No such step was taken, however, by the Company, but a commission, to which reference is made later, was appointed by the United States Government to examine and report on the canal route and scheme generally. The value of a personal examination of the project on the ground is self-evident. It is very doubtful whether the report of a committee sitting in London would have had any great real value, whatever its effect financially or politically might have been. The danger of accepting the opinions of such commissions was forcibly illustrated in the Paris Congress of May, 1879, of which so many distinguished engineers were members.

Chapter III.

THE QUESTION OF GUARANTEE.

MEANWHILE, acting upon the unanimous report of a committee of the United States Senate in favour of the proposal that the United States Government should take the matter up as a national enterprise and should build the canal, bills were introduced into the Senate and the House of Representatives, and duly passed by a committee in each house[1] to which they were referred, providing for the acquisition of the shares of the Construction Company, and the Maritime Canal Company (under a financial arrangement with a new Construction Com-

[1] In the report of the Senate committee on foreign relations, on the pending Bill, it was stated that when the Canal Company, after prosecuting part of the work, ran short of funds, "capitalists from Europe made propositions to the company, which are yet pending, to enter into an agreement for the completion of the canal on terms far more liberal to its present owners than any that have been offered by the United States;" and it was maintained that, "if action by Congress is delayed unreasonably," the company would be compelled either to abandon its concessions and lose the money already invested by it, or to accept the offer made by the foreign capitalists. On this ground it was urged that Congress should act, in order that the canal may not be placed "under the control of a European government" or "in the power of European capitalists."

pany and the Maritime Canal Company), by means of a Bill which was introduced in the Senate on the 10th December, 1894, and which passed on the 25th February of this year.[1] The one before the House of Representatives failed to pass. The Senate Bill marks an entirely new departure of a far-reaching character in the policy of the United States towards the whole question of encouragement of public works by state aid, whether within or without their territories. It provides for the guaranty of $70,000,000 of bonds of the Maritime Company, bearing interest at 3 per cent., payable quarterly, the principal to fall due in not less than ten, nor more than thirty years. Each bond is to bear the following guarantee:—"The United States of America guarantee to the lawful holder of this Bond the payment by the Maritime Canal Company of Nicaragua of the principal of said Bonds, and the interest accruing thereon, as it accrues." An additional $30,000,000, is to be issued without guarantee. It leaves $70,000,000 of the entire capital stock of the company in the ownership of the United States, which will hold a mortgage lien on all the property of the Canal Company. $6,000,000 is to go to Nicaragua, $1,500,000 to Costa Rica, and the remaining $22,500,000 is to be used in extinguishing former issues of stock, and towards the construction of the canal.

Each bill provides for a maximum sum of $4,500,000, which may be reduced, on accounts being rendered, by the Secretary of the Treasury, as the amount estimated as having been expended in construction and for machinery,

[1] Vide Appendix No. VIII.

houses, railroad, and telegraph lines, docks, wharves, breakwater, and sea-wall, and other expenditures by the company. The outstanding obligations of the Maritime Canal Company, which both bills require them to take up, and extinguish, are as follows:

Stock sold for cash	$1,023,500
Stock paid for work	3,190,000
Stock paid for concessions to the owners	12,000,000
	16,213,500
Bonds issued for work	6,855,000
Total obligations for stock and bonds outstanding	23,068,500

The $12,000,000 of stock issued to the owners of the concessions in payment for their property is struck out, even on the terms of the Senate Bill, which provides $11,500,000 to pay $23,068,500 of reported outstanding obligations.

The interests of the United States Government are safeguarded by various stringent regulations and the previsions of the bill are well devised for the purpose of preventing any misapplication or waste of the money. The Secretary of the Treasury is to have general supervision of the project, and a board of fifteen directors is to have immediate charge of the work, ten of whom will be elected by the president, with the advice and consent of the Senate, and no two from any one State. An amendment to the bill of great significance provides that all material and supplies of every sort shall be purchased in the United States, "except such material and supplies

as may be grown or produced in Nicaragua or Costa Rica," or not grown or produced in the United States. Truly an extraordinary measure for the government of a great country to adopt.

The commission referred to above consists of three engineers, whose duty it is to "ascertain the feasibility, permanence, and cost of the construction and completion of the Nicaragua Canal," who are now employed in carrying out their mission in Nicaragua. The commission is to visit and personally inspect the route of the canal, examine and consider the plans and profiles, prisms, and specifications for its various parts, and report thereon to the president on or before November 4th next. The members are Colonel W. Ludlow, U.S.A.; Civil Engineer Mordecai T. Endicott, U.S.N.; Civil Engineer John Noble, of Chicago. The commission is accompanied by Mr. Menocal, unofficially. It is important to note, however, that if the terms of the bill be considered unfavourable, it is by no means certain that the Construction Company is bound to accept it.

As regards its political aspect, confidential communications on the subject are said to have passed between our own and the United States Government, and that no objection had been raised to the action being taken. In any case it would seem that, under the Clayton-Bulwer Treaty of 1850,[1] any connection between the Atlantic and Pacific Oceans, by ship canal through the State of Nicaragua, will have to be neutralized, in the same way as was the Suez Canal in 1888.

[1] Appendix No. I.

In the course of the last debates in the United States Senate and House of Representatives, the questions were raised as to whether a guarantee such as proposed is constitutional and politic, and whether the canal was physically possible.

It was argued that the United States Government has not the power to grant a subvention, inasmuch as the law, while it does not prohibit, nowhere contains provision for sanction, whether *within* or *without* United States territory. It was also maintained that the only example of a public work thus supported is the Union Pacific Railway, which lies *within* United States territory and is a purely American work to carry American internal trade. The precedents quoted by Mr. Morgan—the Gadsden purchase from Mexico of a vast territory, under the treaty of Guadalupe Hidalgo, and the purchase of Louisiana—are not apposite, because in one case the United States Government had possession, and in the other possession was delivered, both being *bonâ fide* transfers of real estate between independent and sovereign governments of the world. It is evident that the proposed guarantee cannot be covered by any such question of purchase.

The history of the Pacific Railway was quoted against the grant of a guarantee, and with some effect, because the "subvention" given in that case has been by no means a remunerative transaction for the United States Government, for the principal, amounting to £12,800,000 ($64,000,000), which was guaranteed, has never been paid, and the United States has, moreover, paid out as

interest thereon, £20,374,722 ($101,873,611). All that the United States Government apparently got from it in money return was a credit for transportation during the war and otherwise, which reduced the interest paid to £14,600,000 ($73,000,000). It was said that the United States Government "holds nothing to-day but a right of way 100 feet wide, some ties and the track upon the ties," but this, of course, cannot be accepted as a serious statement. In any case there can be no doubt that the railway has been of immense value to the government and country generally.

No government, it was urged, ever supported a canal project as it is proposed should now be done, and the Suez, Panama, Corinth, Baltic, and Manchester Canals were referred to in the course of the debates. Only the first two of these could in any sense possibly be considered apposite. The Suez Canal, it is true, was not aided by the French Government; the people of France held one half the stock, the balance being taken by the Khedive (absolute ruler under the Sublime Porte), who actively assisted the work by *corvée* and in other ways. The Panama Canal was not undertaken or supported in any way by the French Government; the corporation, authorized under an Act of Congress of the Republic of Colombia, raised money from the French people by means within the memory of all. But it must be remembered that in the cases of Suez and Panama these enterprises were situated at points not only within foreign states, but remote from France and outside its natural sphere of influence.

The Corinth, the Baltic, and the Manchester Ship Canals were all internal works, within the territories of the countries which carried them out. In the first two cases they were made by the governments of Greece and Germany respectively; the last undertaking, a private one, received its only support from the municipality of Manchester.

India furnishes no precedent in favour of such a guarantee, for while subventions in different forms have been freely given in the past and in a modified shape are still offered, for works within British territory, none has ever been expended in any work of public improvement, outside of its own limits. A case in point was the proposed Burmah-Siam-China railway, originated and advocated by the writer for years.[1] In that instance the government of India, influenced by the ex-territorial consideration, declined to support the scheme. Again, in 1887, I submitted a report to the Imperial Government urging most strongly that a guarantee should be given for the entire line which would unite "the two most populous countries of the world," India and China.[2] This was, I believe, the first proposal of the kind, and came too soon, but not very much too soon.

The railway to Uganda, sanctioned while I write, is a

[1] "Across Chrysê," 2 vols. 1882. Record of exploration through Southern and South-western China to test the capabilities of that region for the extension of British trade, in 1881-82. Also Proceedings and Supplementary Papers of the R. G. S., 1882.

[2] "Report on the Railway Connection of Burmah and China," by Archibald R. Colquhoun and Holt S. Hallett, submitted to Her Majesty's Government and the British Chambers of Commerce, 1887.

case of a line to be made by Britain within a sphere of influence developing rapidly into possession, and is an important departure. The only example of money invested in such a work by any government outside its own territory, is that of the Suez Canal, where the British Government, after hindering the execution of the work, stepped in on the *fait accompli* and by an investment secured its control.

There is all over the world a growing disposition to regard with favour the direct promotion by the State of inland navigation,—more especially in France, Germany, and the United States,—due to a fundamental change in public opinion as regards the functions of the State. The *laisser faire* policy is abandoned, and direct intervention of the State in the affairs of trade and commerce, for the purpose of adding to the wealth and welfare of society, is to-day approved, where a generation ago it would have been altogether condemned.

The renaissance of inland navigation throughout the world is a marked feature. The Manchester, Corinth, and Baltic Canals have been recently opened. France has been greatly extending and enlarging her inland water-ways since 1879; the project for making the Seine navigable for large ocean vessels seems reasonably sure of execution, and the Canal du Midi is entering the realm of the possible. Austria and Hungary are improving the Theiss and Danube, and breaking down the "Iron Gates" that obstruct commerce to and from the Lower Danube.[1]

[1] The main channel at the Iron Gates is to be opened next July, and when completed will have cost about 18,000,000 florins. The work was

Bavaria contemplates the improvement of the Main and its connection with the Danube, by a larger and more serviceable water-way than the existing canal. Not satisfied with the North Sea thoroughfare, Germany has authorised the construction of several other important canals, and it is now proposed to make of Berlin a sea-port. Rome and Paris interest themselves in water-ways, wishing to bring ocean ships to their wharves. The United States have appropriated large sums for the promotion of inland navigation.

Will the United States now go further still, make a new departure,—one of immense importance, with far-reaching consequences,—and expend money on an ex-territorial work of public improvement?

I believe she will, and that we shall see other countries following her example.

The Objects of the Bill.

It has been shown elsewhere that it was the failure of the Frelinghuysen-Zavala treaty of 1884[1] (under the terms of which the canal was to be built by the United States Government), and the insuperable objections on account of the entangling alliances entailed by it, which led to the acquisition of concessions from Nicaragua and Costa Rica, and the incorporation by the United States Government of the Maritime Canal Company. It was

begun in 1890, and will not be fully finished till 1897 or 1898. The force of the current and hardness of the rock make this a notable enterprise.

[1] Appendix No. III.

found that a further step was necessary, or at any rate advisable, namely, the sanction of a bill, such as has recently been passed by the Senate, by which the United States Government would become possessed of as complete a command, "though not legally absolute," as if she actually owned the canal and the country traversed by it.

The bill is certainly the nearest approximation that the United States Government can make to that position, as was repeatedly pointed out by Mr. Morgan in the last debates in the Senate, while avoiding a violation of the sovereignty of Nicaragua and Costa Rica, and an infraction of, or departure from, the Clayton-Bulwer treaty. Mr. Morgan put the case thus:

"So, with such a preponderance of power in this corporation—the corporation owning the whole property, and deriving its charter powers and rights from the United States—it is scarcely to be supposed that we should have a more definite control, though not absolute in the legal sense, if we should own the canal and the country through which it passes. Thus we will have under this arrangement, . . . the nearest approach, . . . that this government can make to that question, and the only channel of approach through which it can get to the question without a violation of the sovereignty of Nicaragua and Costa Rica, and without an infraction of the Clayton-Bulwer treaty or a departure from it, if it is still in existence and if it is not worthy of recognition." And again: "Now, it is a point of very great importance, it is one upon which very much of the merit of this bill rests, that through the medium of these concessions, which are very wisely and

very ably and distinctly and clearly drawn, the government of the United States has the express permission to assume as a stockholder in this corporation the control over the property and management of the corporation, and that is as close as we can possibly get to that subject without what I may call an invasion of the sovereignty of Nicaragua and Costa Rica. . . . The ownership of stock in this corporation is the sole method in sight, or in contemplation, by which the United States can exert an influence over the operations of this canal for the protection and benefit of the government and people of the United States otherwise than by forcible or hostile intervention with the nations or the powers that will control it. . . ."

The *motif* of the bill, then, it is perfectly clear, is to acquire control of the canal; and this is a matter which concerns not only the United States, but the world at large, and, more especially, Great Britain.

In view of the difficulties surrounding this enterprise—difficulties vast and far-reaching, mainly of a political nature—it is certain that the project must be under the auspices of some strong government, and without doubt that government must be the United States. Had it not been for this *impasse*, hitherto hindering the United States Government itself undertaking the building of the canal, it would have been completed long ago. The vicissitudes through which the canal has already passed have made it abundantly clear that the project cannot be carried through as a private undertaking. The work is so great, the benefits it will confer so transcendent, but,

above all, the interests involved so vast and complex, that it should be removed from the chances of private enterprise, affected as they would be by the stringency or fluctuations of the money market, the attitude of the governments of Nicaragua and Costa Rica, and in various other ways which need not now be specified. Under existing circumstances no private company or corporation could complete this enterprise which, notwithstanding its great promise, would, unlike railroads, yield no income during its progress, for the investment could not bring returns until it was proved that vessels could pass right through from ocean to ocean, with reasonable facility, and without delay or danger.

As regards the physical difficulties to be overcome, a subject treated more fully elsewhere, it is sufficient here to say that, if the financial support asked for be forthcoming, the work can be carried through to completion.

Chapter IV.

THE ENGINEERING PROBLEM.—PART I.

THE EXCAVATIONS AND DIVIDE CUTS.

THE character of the material to be removed, both wet and dry, has been accurately determined on the whole route by numerous borings penetrating to the depth required to the bottom of the canal, and at the sites of the dams, embankments, and locks.

The Eastern Section.

Leaving the San Francisco Basin, and proceeding eastward, the route cuts across a narrow neck of the intervening ridge—a spur of the main Cordillera bounding the San Juan watershed to the north—which, as a broad mass of hills, extends, on the south, to the banks of the river San Juan, often rising to elevations of 1,500 feet, while on the north it merges into the main Cordillera. But at the point selected, the spur is nearly divided on the west and east by the neighbouring valleys, whose axes lie on a generally direct line between Ochoa and Greytown, their floors being at about the same level, and

here is found the lowest gap for many miles on either flank.

In the harbour of Greytown and its approaches clean, sharp sand is the only material met with. From the harbour to Lock No. 1, and through Benard Lagoon, the materials are sand and sandy clay, underlying a thin, loamy stratum and decomposed organic matter, and from the lagoon to the lower lock, stiff clay. The harbour and this sea-level portion of the canal will be made with the floating dredge. Slopes of three horizontal to one vertical have been allowed in the estimates; but past experience gained in dredging by the Company in the first mile of canal is said to show that the material stands perfectly for several months at a much less inclination. In the excavation for the railroad through the stiff, tenacious clay predominating in this region, the material stands nearly vertical, but slopes of 1½ to 1 have been estimated for. From the lower lock to the Divide cut this hard clay, with occasional boulders, is the only material found by the boring tool on the axis of the canal throughout, and also at the site of the three locks and the embankment. The clay is impervious to water, and has a large sustaining power, so that no apprehension is felt as to the character of the foundations.

In the deep cut (the Great Divide) the geological formation is clay, overlying solid volcanic rock. Diamond drill borings have been taken along the whole length of the cut to the bottom of the canal at intervals of about 1,000 feet; and the cores brought up are claimed to "settle beyond doubt the character of the material to be

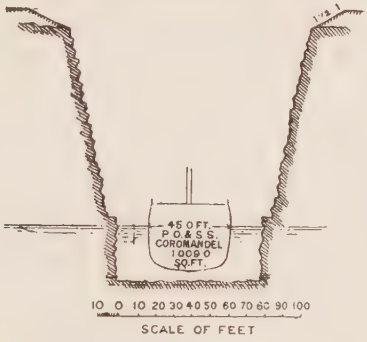
removed, and dispel all apprehension that this cut might be a repetition of the disastrous experience in the great Culebra cut at Panama."[1] The slope allowed in clay is 1½ to 1, and in rock, ¼ to 1 to the level of the water, and below that point vertical. Mr. Menocal is of opinion that there is no good reason why the whole rock excavation should not be made with vertical sides, and he instances the Corinth Canal, where, with a longer and deeper excavation, and the rock less homogeneous and softer, "a slope of $\frac{1}{10}$ to 1 has been carried down to the water level, and the sides do not crumble or slide." This example is an unfortunate one to cite, as it happens that, since the expression of this opinion, a slip has occurred, and anxiety is still felt as to the future stability of the cut. From the Divide to Ochoa homogeneous clay has been found at all points; and the standard

[1] In reply to a criticism made that even with the canal cross-section and the slopes proposed, 80′ × 28′, altered to 100′ × 30′, there are in it 10,000,000 cu. yds. of excavation, "of which about 3,000,000 yds. are surface soil and decomposed lava, and 7,000,000 are solid lavas and indurated or consolidated beds of volcanic ashes of about the hardness and consistency of slate rock," and that it would be interesting to compare the material with that in the great cut on the Panama Canal Mr. Menocal has said: "The Great Divide cut is no doubt a work of considerable magnitude, but there is no serious difficulty involved beyond proportional labour and expense. There is no need to discuss the suggestion that the material may prove to be similar to the Culebra cut at Panama. Diamond drill borings at intervals of 1,000 feet have been made throughout its whole length to the bottom of the proposed excavation, and nothing "suspicious" has been revealed. There is no loose rock, sand or volcanic ashes in it, stiff clay overlaying solid rock being the only material met with."—*Railroad Gazette*, February 24th, 1893.

section in soft material has been adopted throughout. At the site of the Ochoa dam, gravel, clay, and rock in the order named are shown by the borings.

Several important advantages in connection with this work are claimed by Mr. Menocal, all of which may be freely conceded, except perhaps the certain stability of the nearly vertical sides, discussed later.

First :—The material to be removed is mainly solid rock ; and, therefore, the volume of excavation is reduced



CROSS-SECTION OF "GREAT DIVIDE" (NOTE: WIDTH ALTERED TO 100 FEET).

to a minimum, and the cut, when made, will remain so for ever without further expense.

Second :—The material is needed for the construction of the dam at Ochoa, for the embankments between Ochoa and Greytown, for the construction of the locks, for the breakwater at Greytown, and for pitching the sides of the canal, and the surplus can be dumped in the immediate vicinity.

Third :—The centre of distribution is most conveniently located, and were not this material available, at the sole

expense of transportation down grade, it would have to be obtained at considerable cost from quarries in the vicinity, as there is no rock easy of access between Ochoa and Greytown, except in this ridge.

Fourth :—The locality is one of the healthiest in Nicaragua, the drainage is perfect, and water abundant and excellent for domestic uses.

Fifth :—There is close at hand, on both sides of the ridge, an inexhaustible water-power for the economical and convenient operation of all the machinery required to do the work.

The stupendous character of this work will be apparent from the fact that with the section proposed a probable total of about 12,000,000 yards will have to be extracted and removed from a trench less than three miles long, at an average depth of 141 feet and a maximum of 328 feet. The Western Divide is insignificant in comparison, for, though it contains nearly as much excavation, it will occur in a length of nine miles, with the greatest depth only 72 feet.

The Great Divide is one of the three problems presenting any doubt whatever as to their entire practicability on the plans proposed, the other two being the Ochoa dam and the harbour at Greytown. In his report, Major Dutton gives the following account of the cut :

" At the head of the Deseado basin, and three miles distant from the upper lock, the greatest of all the individual works of the canal begins. A cut of vast proportions is necessary to force a water-way from the coastal plain and Deseado watershed into the basin of the San

Francisco and its tributaries. The canal line is located through a peninsula of the high tableland, already spoken of. Its summit is channelled with numerous minor watercourses, cutting across the canal line perpendicularly, giving an undulating profile to the longitudinal section of the canal. The result of these minor channels is to produce a succession of ridges through which the canal must penetrate. . . . The total estimated excavation,[1] is about 9,000,000 yards, of which about 2,000,000 yards are surface soil and decomposed lava, and 7,000,000 are solid lavas and indurated or consolidated beds of volcanic ashes, of about the hardness and consistency of slate rock.

"A series of borings has been made along the entire line at intervals of about 1,000 feet, and the cores brought up indicate the character of the rock. Besides the specimens of consolidated ashes, which appear to form but a small proportion of the mass, two very distinct kinds of massive lava are indicated. One is a common dark andesite, the the other a more silicious and nearly white rock, termed dacite. Both varieties are well known to lithologists, and are in no respect abnormal. The character of the material through which this great cut must be made is a matter of the gravest importance, for upon it depends the stability of the nearly vertical walls of the cut. So far as the borings have proceeded, the indications are favourable. Nothing has yet been disclosed by them which affords cause of apprehension.

"The occurrence of some local deposit of loose, inco-

[1] This with a width of 80 feet, since altered to 100 feet.

herent, or slippery material inclosed between beds of lava may have escaped the diamond drill thus far, and the existence or non-existence of it should be placed beyond doubt before the work of excavation is begun. The intervals between borings thus far made—1,000 feet—seem too great in a situation where so much is involved. The unforeseen disaster which befell the Panama Canal enterprise, when the great Culebra cut was attempted, may add emphasis to this suggestion. This disaster, however, might have been foreshadowed, had any borings been properly made in advance. Those made at the Nicaragua Divide cut thus far have disclosed nothing of the sort; but it is impossible to exercise too much caution, or to make too sure of the safety of the walls. The water-way is 80 feet wide, and 28 feet deep,[1] with a rectangular section. On each side is a berm or footpath 5 feet wide, from which the walls ascend with a batter of 1 foot in 5. The question may be raised whether the walls are not too near the vertical. In very firm rock, well bedded and free from oblique joints or soft pastings, no hesitation would be felt. Volcanic rocks, wherever they are massive and free from interbedded layers of a treacherous nature, furnish quite as good and as stable walls as any other classes of rocks, and are quite as durable against the action of time. They are, however, liable to include seams of a yielding nature, and those should, if possible, be ferreted out in advance, if any exist. Thus far none have been discovered; but before the work is begun, it would appear to be prudent to make

[1] Altered to 100 feet by 30 feet.

a very detailed examination by many borings in those parts of the cut where the walls must have great altitude."

In my opinion Major Dutton's view as to the necessity of further borings is quite justified, and the slip which has occurred in the Corinth Canal emphasizes this view, setting aside the Panama-Culebra disaster, where no borings had been made.

I believe anyone who has seen the Kimberley slips, would commence operations on this work with a considerable sinking of the heart. There the slips started, I believe, about 100 to 150 feet below the surface (as far as my memory serves me), the mine being about 450 feet deep at the time. The surrounding country is flat, generally a very important matter, the rainfall is inappreciably small, and the measures make next to no water,—all conditions therefore more favourable than in the "Divide."

If there are no measures on which slips are likely to take place, and the rock is flat-bedded and strong a slight batter on an open cut might answer. But if the rock, on the contrary, is very much broken with horizontal or inclined measures, where the height of rock is more than 160 feet above canal level, I believe a tunnel of appropriate shape (if 120 feet heading is sufficient) would not alone be cheaper but safer. It has been generally agreed that just as a lock canal should not be employed unless a sea-level canal was impossible, so a tunnel canal should not be adopted unless the accumulation of difficulties and consequent cost rendered a canal without a tunnel out of the question. The cutting out of loose rock and facing,

or even toothing, in a thin arch lining would probably be cheaper than the extra excavation. With such depth and width there would be no great difference in cost of excavation per cubic yard. By paying proper attention to slope of sides and shape of arch so as to suit the same to the dip of the measures, rise of ground, etc., the result would, I think, be more satisfactory than with an open cutting with nearly vertical sides, although the height of 160 feet may possibly be too small.

The Western Section.

From the lake shore to the Tola basin the excavation is in rock and clay, rock predominating through the Divide and clay in the valley of the Grande. Borings have been made to the bottom of the canal all the way to the sea, and the amount and character of the material to be removed accurately ascertained. From the basin to Lock No. 6, clay is the material met with, and in the harbour area principally sand, with some mud and clay in the upper section.

EMBANKMENTS AND DAMS.

The section of the river from Ochoa to the lake is to be made navigable by the construction of a dam at Ochoa, just below the Machado, maintaining the water at an elevation of 106 feet above sea level,—namely, 4 feet below the lake,—a fall of three-quarters of an inch to the mile being allowed for the slope necessary to dis-



WESTERN DIVISION.—LAKE N

TO THE PACIFIC OCEAN.

charge its waters. For purposes of navigation, however, that portion of the river will become an extension of the lake. As noted elsewhere, an important effect of the dam will be to raise the water from the river San Carlos to the level attained by the San Juan at their confluence, the valley of the San Carlos being thus converted into a lake, and becoming an integral part of the summit level of the canal.

The dam is placed between two steep hills, the length of weir on the crest being 1,250 feet, and of abutments 650 feet. When the survey was made the average depth of water in the river was 8 feet, and the maximum depth close to the southern abutment 14 feet, the width between the banks being 950 feet. It is calculated by Mr. Menocal that, with a mean flow in the river of 20,000 cubic feet per second, the depth of water on the top of the weir will be about $3\frac{1}{2}$ feet. The average height of the dam above the river bottom is 61 feet, its thickness at the top 30 feet, and at the bottom about 500 feet.

The embankments[1] in the valleys and on the crest of the confining ridges it is proposed to make water-tight with the clay, of excellent quality for this purpose, prevailing everywhere in the hills and valleys, but to be taken principally from the excavations. Of these embankments, two in the valley of the Deseado and six in the San Francisco basin will be of considerable height, especially

[1] The embankments rise 8 feet above the water surface, with top widths of 12 feet if not over 8 feet high, 15 feet if not over 15 feet in height, and 20 feet for heights about 15 feet; the water slope to be 3 to 1, and the dry slope $2\frac{1}{2}$ to 1; the tops and the water slopes to be paved with 2 feet of well-laid stones.

the latter, as the surface earth will be removed to a depth sufficient to insure a solid and secure foundation. The maximum water pressure against the Deseado dams will be 45 feet, and in the San Francisco but little more than 60 feet, as water always lies on the surface or little below it in the valleys. These embankments, intended to impound so large a volume of water, are important works; and in their construction great judgment and care must be exercised. It is claimed that they present no more serious difficulties than have already been successfully met in many other parts of the world, but the instances given do not seem apposite, as will be shown later, and I know of no works of similar character and equal or greater magnitude.

The Ochoa and Tola dams are the keys controlling the canal problem, at the east and west ends of the summit level. The former work, in which a novel method of construction is contemplated, has been for years the subject of long and careful consideration. The diversion of the river San Juan is acknowledged to be almost impossible; and construction by the usual methods, with either cut stone or concrete, in opposition to the power of the San Juan, is a problem involving the most serious difficulties. It was at first proposed to build a stone dam upon a series of arches supported by piers starting from the foundation, through which the river waters could flow freely during the construction of the main part of the structure, these openings to be closed by gates in the upper side when the upper part of the dam, its approaches and aprons, were completed; and then to be filled with

masonry from the lower side, while the water was rising in the basin. This was, perhaps, as a practical solution, about the best, under the circumstances, for that style of dam; but its execution would be tedious, difficult, and expensive, and there would be always present an element of doubt not easy to eliminate as to the final success. The building of the foundations and pilasters for the support of the arches in constant contention with the whole river would be a most difficult undertaking, in which the items of time and cost would remain unknown quantities until its completion. Another plan, known as the "rock-fill" dam, has since been adopted, which is claimed to embody simplicity, economy, and safety. Mr. Menocal describes it thus:—"It consists in dumping from an aerial suspension conveyor large and small material, properly assorted, across the river from bank to bank until a barrier is created sufficiently high and strong to arrest the flow and hold the waters at the required level: the body of the dam to be made of large blocks of stone, weighing from one to ten tons, and smaller material to fill the voids. Its base will be broad as compared with the height, probably from 400 to 500 feet between the foot of the up-stream slope, and the end of the apron. The top is estimated 30 feet wide, the rock up-stream slope 1 to 1, and the apron, or down-stream slope, 4 to 1, with the lower portion flattening down to 5 or 6 to 1. On the up-stream side small material, such as stone, fragments of gravel, clay, etc., selected as circumstances may require, will be deposited as the work advances in sufficient quantity to make it as tight as wanted. It is not expected, or

even desirable, to have a water-tight structure,[1] the object sought being simply to oppose such an obstruction to the river as may be necessary to hold the waters at the required level. The minimum flow of the river is about ten times the water needed for working the canal. Consequently nine-tenths can be wasted with advantage. That the dam will eventually become tight there can be no doubt, as the small drifts and detritus forced in by the current will gradually fill the voids and consolidate the structure.

"The method of construction will be quite simple. After protecting the abutments against possible erosion, large pieces of rock will be dumped in the bed of the stream from three or four cableways spanning the valley. The material should be distributed uniformly over the area under the main portion of the dam, commencing up-stream, and keeping up, as nearly as possible, an even level. Scouring will soon cause settling of the blocks into firmer soil, the upper level in the meantime being constantly raised by depositing more stone, while the small material is being forced by the current into the voids, and the overflow dislodging and rearranging the unstable blocks until they reach a final resting-place. This process to be continued until the resistance at the

[1] Mr. Menocal elsewhere says: "As long as the summit level can be maintained at the required elevation, the leakage through the rock fills, acting as safety-valves, may be regarded as an element of security rather than one of danger, especially as the tightening of the dam may be regulated by depositing suitable material on the up-stream side, or by dumping more stone on the lower slopes or on the crest, so as to preserve the desired elevation of the surface of the water."

bottom becomes so great as to check scouring due to maximum pressure, when the dam will be carried up to the desired level. The river, in the meantime running over the mound, will readjust the material and adapt the apron to the necessary conditions of stability to withstand the effect of the fall and carry off the water safely. If the dam is then raised so as to shut off the whole or the largest part of the river flow, which can by that time be discharged over the waste weirs, the structure will be permanent. If the river is not able to prevent the completion of this work, having on the contrary greatly contributed to its construction by a better distribution and consolidation of the material, now that the waters are diverted to another outlet, no fear need be entertained as to injury from that source. There may be some settlement and final readjustment of the component parts for some time after completion, but that can be easily remedied by depositing more material where needed. It is believed that this dam will be safer, as it is by far more economical, than a stone dam. An earthquake might cause serious damage to a masonry dam, but it can do no harm to this. On the contrary, it may add to its consolidation by bringing the parts into closer contact. There are no cemented joints to be opened, and a seismic disturbance would have a tendency to compact rather than to disintegrate the large mass. The rock for the dam will be brought by rail from the Divide, and delivered immediately under the wire cables, each one of which will be capable of handling and depositing about 1,000 tons in ten hours. Consequently, the work can be com-

pleted in from four to five years, and, if need be, in less time."

The design of this dam has been the subject of considerable discussion in the engineering world at large, as well as during the recent debates in Congress. In defence of this plan it is claimed by Mr. Menocal that the most dangerous stage of the work will be during the period of construction, when the whole volume of the river will be running over the mound, and that when the latter is carried up to its full height, the weirs discharging their proportion of the overflow, the river will be under perfect control and powerless to do harm.[1]

In his report Major Dutton says :—"The bed of the river is deep sand, the rock having been found only a short distance from the river bank, at a depth of 20 feet below the present water level. It is probably deeper still in mid-

[1] "If we assume a maximum flood volume in the river of 75,000 cubic feet per second passing over the unfinished work," says Mr. Menocal, "the water will flow with a depth of 7 to 8 feet and a speed of about 9 feet per second or six miles an hour. Comparing this with the ponderous force with which waves 25 or 30 feet high strike against the sea slope of a *pierre perdue* breakwater—such as Table Bay or Holyhead—rolling up the incline in the shape of enormous breakers and descending with frightful speed, what will take place at Ochoa is mere child's play, and yet those breakwaters are built up in opposition to those ponderous forces by the process of dumping stones of all sizes from fifty pounds to two or three tons until the structure projects enough above the sea to prevent the waves breaking over them. The inclination assumed by the sea face under those conditions is, generally, 6 to 1, and on the lee side, 2 to 1. We feel confident that with proper care in the selection and distribution of the material, the stones will not drift far from where they are needed, and that the down-stream slope of the dam will not exceed 6 to 1."

channel. The plan proposed by Mr. Menocal is a bold and novel one. It consists in throwing large blocks of stone taken from the Divide cut into the river, and allowing them to find their own resting-places. The erection of a dam to the required height thus becomes a question only of the quantity of rock available. If it can once be built to the required height, that fact alone would be an ample guaranty of its stability.

"To construct them (the embankments) of masonry is impracticable for want of suitable material, independently of cost. To construct them of loose earth would be too perilous, owing to the great difficulty of making them impermeable by water. By far the best resource is the one adopted, of building 'loose rock dams.' This construction, if not peculiarly American, has at least had its best exemplifications in our far Western States. Their cost is but little greater than earthworks, and they are far safer, especially when as high as those under discussion. A moderate amount of leakage or a large amount of permeation in nowise endangers them. But under no circumstances must they be permitted to overflow, or their destruction is certain and immediate. Even solid masonry in a dam 60 feet high is sure to be tapped and undermined in the course of time, if a large body of water is discharged over it. There is no difficulty or danger in building a loose rock dam 100 feet in height, provided the following conditions are complied with :—first, a rock foundation ; second, proper slopes to the front, which should not be greater than 4 of height to 7 of base ; third, ample waste weir in some other part

of the periphery of the basin; fourth, proper facing of the back of the dam, and puddling at the foot of the back wall. All of these conditions can here be met. . . .

"After much reflection I am fully convinced that the project will be a successful one, and that no serious objection to it can be raised. Sooner or later the stones thrown in must find resting-places, whatever the volume of water may be that flows over them. In time and by accretion a barrier will be formed, raising the level of the water behind it. This will produce a hydraulic pressure, one effect of which will be to wash out the sand in which the first blocks are embedded, causing them to sink. As the barrier rises, this action will become more pronounced, the layer of rocks sinking lower and lower until they strike bed-rock. Meantime, many of them will be carried down-stream, perhaps far down, to still water. But, eventually, all must reach resting-places.

"The final slope of the lower face of the dam cannot be foretold. It will depend largely upon the sizes of the blocks. But there is little probability of its exceeding 1 in 8, and none whatever of its exceeding 1 in 10. provided that two-fifths or more of the entire mass is composed of blocks weighing one ton or more. With a slope of 1 in 8 and an up-stream slope of 1 in $1\frac{1}{2}$, the cubical contents of the dam may be roughly estimated at fully 1,600,000 cubic yards. This is double the estimate of Mr. Menocal. Experience may prove that a greater slope will endure, and thus require a smaller amount of filling; but it seems to me that the foregoing estimate will be much nearer the final result.

On the other hand a largely increased estimate of the cubage of the dam does not by any means imply a corresponding increase in the estimated cost of construction. In truth, it is questionable whether double the estimated volume will increase the total cost more than 20 per cent. or would make any serious inroad upon the estimated contingencies. It is to be remembered that the cost of quarrying the stone and loading it upon cars, the cost of constructing the railway and its equipment, the cost of hauling away from the Divide cut in part, are chargeable to the estimate for the Divide cut. In a word, the stone costs nothing, so far as the dam is concerned, until after it is loaded upon the cars, and the only cost is the difference between the expense of hauling it sixteen or eighteen miles and the expense of hauling it two or three miles. . . .

"So far as the safety of the dam is concerned it may be said that if it is once built in the manner proposed it will stand. Six or seven years will be required to build it, and in that time it will be tested by as many annual floods of long duration. Its completion will bring with it the demonstration of its stability."

Higher dams across larger streams, but of dissimilar construction, it must be noted, have been built in many parts of the world, the comparative dimensions of some of these works being as follows:

NAME OF DAM.	LOCATION.	LENGTH AT TOP.	TOTAL HEIGHT.
Villar	Spain	546	175·2
Gilleppe	Belgium	762	164·5
Puentes	Spain	925	164·0
Vyrnwy	Wales	1,350	146·0
Habra	Algiers	1,060	137·0
Ashti	—	12,709	58·0
Tansa	India	8,500	118·0
The Quaker Bridge Dam ...	United States	1,400	265·0
Khandari nullah	India	1,680	71¼
Mutha River	India	3,683	106·0
Austin[1]	Texas	1,360	68·0

In a critical article by Professor Intze, of Aix-la-Chapelle,[2] on the Nicaragua and Panama Canals, in discussing the question of dams, he gives many examples, among others the Walnut Grove Dam—33·6 metres in height—on the Hassayampa River, in Arizona, which, in February, 1890, was destroyed by a flood. The dam is particularly interesting, as a construction was here carried out which is said to have been employed for more than twenty years in many dams in the west of North America.

Is a rock-fill, or loose rubble dam, constructed as pro-

[1] The great dam in the Colorado river, at Austin, is a work of importance, Texas being said to possess in the falls created a "second Niagara." The river just above Austin emerges from between high hills, having traversed a distance of over 400 miles from its head waters. The dam, which spans this cañon, is built of masonry. The most notable feature of the work is that it spans a large river subject to great floods, when as much as fifteen feet of water are passed over its crest. The dam provides power for the operation of an electrical and water-works plant for the city, besides the reserve power for manufacturing plants.

[2] "Zeitschrift des Vereins Deutscher Ingenieure," October 6th, 1894 (concluding article).

posed, certain of stability? The case is put thus by "Engineering," in a critical examination of the question:

"The point of practical interest is that during the dry season, or eight months per year, the minimum hourly flow past Ochoa will exceed 1,000,000 cubic yards, and in the wet season, or four months per year, it will exceed 4,000,000 cubic yards. Supposing that the locks on each side of the lake were opened and closed once per hour (on an average), which would be sufficient for the accommodation of at least 13,000,000 tons of shipping per annum, this would only expend some 120,000 cubic yards of water, and would not sensibly affect even the dry-weather flow of the San Juan river, so that the dam at Ochoa will have practically to regulate the flow of the full amount above mentioned—that is, at least 1,000,000 cubic yards per hour in the dry season, and at least 4,000,000 in the wet season. The dam must, therefore, become a clear overfall weir over its entire length of 1,200 feet, with at least 1 foot 8 inches of water during the dry season, and at least 4 feet 2 inches during the wet, passing over its crest.

"Such an overfall must speedily cause more or less destruction of a weir composed of loose stone rubble, no matter what its dimensions across the crest may be, and render the maintaining of a constant water level at or above 106 feet for the feed of the locks a practical impossibility. Any alteration in the level of the feed of the locks below 106 feet would seriously interfere with, if not absolutely interrupt, the whole working of the canal, and a rise of four feet or five feet, though less harmful, must

also be very inconvenient, as it would tend to silt up the lock chambers with some of the superabundant material that the flood waters hold in suspension. On the whole, it seems probable that the solution of this serious physical difficulty is to be sought solely in the direction of a dam or weir of more permanent and solid construction (that is, of more expensive and costly character), and in the adoption of some collapsing device in connection with the weir, which shall proportionately increase the spill water area during flood time, and avoid the inconvenience of a rise in the level of the overflowing water, relieve the dam from risk of possible damage by the sudden increase in volume and velocity of the water, and, finally, automatically maintain an approximately unvarying level in the free navigation and the lock feed. This, of course, means enormously increased cost in dealing with a question, the importance and difficulty of which the canal company seem to have, so far, considerably under-estimated."

It will be seen that the view of "Engineering" is entirely opposed to that of Mr. Menocal and Major Dutton.

First of all as regards the remark that "leakage would be an advantage." This, it seems to me, may or may not be the case. Where the ground is bare, and surface rock, or depth of water small, and rock at no great depth, then throwing in the excavated rock material and depending on the silting may answer, and would, perhaps, be the cheapest way of constructing the dams, but I think that in all cases it would be preferable to put in a clay or concrete trench, even if not brought up much above

ground level. The danger from leakage is not, it seems to me, in the upper part of the dams, but at their junction with the ground. The amount of leakage here, where it would be destructive, strikes me as a very uncertain factor, and it would be better to bring the work up gradually, and fill in earth or sand with the stone, allowing it to be carried in by the water, than depend on the silt carried by the stream only. Where practicable, the rock should be tipped to a fixed width at bottom, rather than pell-mell, letting the stream carry it where it chose, where the stream is a large and powerful one. Major Dutton says that the final slope of the lower face of the dam cannot be foretold, that it will depend largely on the sizes of the blocks, but that there is little probability of its exceeding 1 in 8, and none whatever of its exceeding 1 in 10, provided two-fifths or more of the entire mass is composed of blocks weighing one ton or more. Possibly he is right; but to form any idea of the slope it would be necessary to look into the velocity of water developed during construction, and the nature of the bottom. This whole question requires further careful consideration.

The feasibility, or necessity, of laying the river dry (I should rather say advisability) in order to carry down a core (as proposed by Professor Intze) is another matter. It is, in my opinion, without a study of the ground and of the bed of the San Juan, a vague speculation, possibly an idea which might be worth investigating, but, I am inclined to think, without satisfactory results. That a core, or even masonry dam, could be put down, I have no doubt, and one or other in some shape or form English

engineers would do, I believe. This, it seems to me, could be done without incurring prohibitive expense. The dam itself is, for the undertaking, too important a work to justify risk for the sake of a million pounds.

A shell casing to the dam would, in my opinion, rather increase the danger than otherwise where a water-tight junction with an impervious strata was not established, and the danger is that if the work were carried out in this way, although it might be practically tight for a time, leakage might years after be set up at the junction of the surface and dam, and cause a collapse.

The Deseado.

At this point the valley is spanned by a dam 70 feet high and 1,050 feet long, which, together with several small embankments in the gaps of the ridge, aggregating in length 5,800 feet, and having an average height of 20 feet, encloses a basin over 3 miles long, in which a depth of from 30 to 70 feet is obtained without excavation for a distance of 2·60 miles.

The summit level, therefore, stretches from the upper lock on the Pacific slope to this point, a total distance of 154 miles, or from within $2\frac{1}{2}$ miles of the Pacific to within $12\frac{3}{4}$ miles of the Atlantic.

The upper lock in the eastern slope is located close to this dam. It will drop the level 45 feet into another basin formed by a second dam (43 feet high, and 820 feet long), and five embankments (with total lengths of 1,763 feet by about 20 feet high), to close depressions in the

confining ridges. The length of this basin is 1·95 miles, the water level 61 feet above datum, and the depth 30 feet or more. By lock No. 2, at the lower end of the second basin, the water level is again lowered 30 feet into a third basin extending for a distance of 1·25 miles to lock No. 1. By connecting this last lock with the



RAILWAY UNDER CONSTRUCTION THROUGH SWAMP.

flanking hills by 10 small embankments, the lower section of the valley is partially flooded, and the excavation materially reduced thereby. Lock No. 1 drops the canal 31 feet to sea level. From this point to the harbour of Greytown, a distance of 9·30 miles, the canal traverses an alluvial sandy and swampy plain, but little elevated above the sea, with no features deserving of special mention.

A serious difficulty was anticipated in excavating the canal and forming the banks, in a solid and permanent fashion, through the low-lying region situated between the foot-hills and Greytown, known as "the Deseado swamp." This was cleared of its heavy timber, dredges were set to work, and the work was found easy. Banks



RAILWAY COMPLETED THROUGH SWAMP.

were thrown up for the canal, and an embankment for the railroad which is to traverse the swamp; and so solid was this material that it was found possible to abandon the original plan,—namely, that of building these banks upon "corduroy," to prevent their sinking out of sight.

The peculiarly solid character of the material is accounted for by the fact that, while the waters of the San Juan River are never discoloured by silt, or

sand, or mud (as mentioned elsewhere), the San Carlos stream, rising in Costa Rica and having a course of south-west to north-east, in times of flood is charged heavily with earthy material, in reality volcanic *detritus*. This discharges below the dam, through the Colorado Channel, into the Caribbean Sea. The perennial trade winds take it up and deposit it upon the outside of the Peninsula at Greytown.

The La Flor Dam.

Numerous deep borings, made at the site of La Flor dam, showed the solid rock ledge to lie much deeper than the first auger operations indicated, and the original plans had, in consequence, to be materially modified. It was intended to build this dam of "rock-fill," on the same principle adopted at Ochoa; but the great depths of soft earth overlying the rock ledge, in places 96 feet below the valley, renders that plan inapplicable, especially as here, unlike the San Juan, there is no large flow of water to assist in scouring the soft soil and in consolidating the "fill." A dam, with solid masonry core and earth slope, is now proposed, spanning the valley with a length of about 2,000 feet, an extreme depth, for 1,000 feet of its length, of 170 feet from crest to foundation of core (of which 70 feet will be above ground), and, in addition, core walls, aggregating about 500 feet in length, penetrating the abutment hills to the rock ledge. Locks Nos. 4 and 5 will also rest in this bed of rock, forming part of the dam abutment, and connecting with the core

wall at the western end. A waste weir, about 300 feet long, will be cut on the east side for the discharge of surplus water into the lower bed of the Grande. All this comprises a very important piece of work, but if good rock foundations and suitable material be available, as it is said they are, there is nothing to indicate serious engineering obstacles. Concrete will be used for the core walls and locks, the rock to be obtained from the (Western) Divide cut. The earth for the puddle fillings and embankments can be had from the canal excavation, or from the valley in the vicinity of the works.

DRAINAGE. LOCKAGE. LOCKS. CROSS SECTIONS.

In a country subject to a rainfall of 300 inches in the year, and more than 6 inches in twenty-four hours, the problem of drainage involves a contest with forces of nature whose destructive powers are a constant menace to engineering works, however careful and skilful their design and execution, and it is of the utmost importance, therefore, to reduce these forces to a minimum before the construction of works is commenced.

Drainage (Eastern Division).

The large territory embraced between the ridge confining the basin to the south and the "lower route,"—the term used to designate the canal line formerly proposed on the left bank of the San Juan river,—is, by the

adoption of the "upper route," entirely eliminated from the problem of drainage, leaving only that portion of the watershed north of the ridge, from the Divide to the valley of the Machado, to be provided for.

The problem of disposing of the surplus waters in that portion of the route from the basin of the San Juan to the lower Deseado is one of importance. The flow of the San Juan at Ochoa at high flood in both the San Carlos and San Juan has been found by careful gauging to be 42,000 cubic feet per second.[1] The river is known to have risen somewhat higher, however, and, as no gauging was made at the time, the above figures have been increased by 50 per cent., making the possible maximum flow 63,000 cubic feet per second, of which it is believed not less than two-thirds would probably come from the San Carlos, the upper San Juan not being subject to great alternations of flow. The combined basins of the San Francisco region have a watershed of about 65 square miles; and, allowing for a maximum rainfall of 12 inches in twenty-four hours—about twice the greatest rainfall—there will here result a possible discharge of 21,000 cubic feet per second. The watershed of the upper Deseado basin is about twelve square miles, which on the above basis will yield a discharge of, say,

[1] A more thorough investigation of the discharge of the San Juan river is, in Major Dutton's opinion, desirable. As the handling and disposal of its waters will involve works of great magnitude and cost he suggests that a very careful measurement of its flow and fluctuations should be made, and a rating curve obtained, showing the ratio of discharge to height of water established by measurements maintained for two or three years.

4,000 cubic feet per second. In all, there will be a total of 88,000 cubic feet per second, for which provision must be made. No deduction has been made on account of consumption in lockage, which may reach 1,500 cubic feet per second, nor for leakage, which may take up a much larger amount. Considerable allowance should, however, be made for the new conditions established by the introduction of large reservoirs, which will hold the waters back and regulate their gradual discharge in lieu of rapidly inclined streams fed by precipitous watersheds, which collect and discharge the rain-water almost as fast as it is precipitated. Yet all these considerations are for the present kept in reserve as a large margin of safety.

Provisions will first be made for the discharge of 63,000 cubic feet per second from the basin of the San Juan.[1] In doing so, care will be taken to prevent a large discharge at any one point, which is likely to cause serious accidents by undermining and scouring, or undue sudden changes in the level of the water. A large overflow

[1] Major Dutton says, in discussing the question of disposing of the flood waters: "The area of the San Francisco watershed, and that of its tributary, the Chancha, is somewhat considerable, and though it is not at present exactly known, it cannot be less than 65 square miles above the proposed line of embankment. There will also be a flow of water into the basins through the canal from the San Juan. The amount of water to be disposed of during heavy floods may, therefore, be very large. The formation of large basins gives control, and all that remains is to provide ample waste weirs. These weirs, however, constitute a problem requiring careful consideration, the importance of which becomes clear when we consider the limiting conditions governing the construction of the embankments."

in the vicinity of a dam will be avoided; and in the San Juan basin the current will be directed for its outlet towards the southern end of the San Carlos basin; at any rate, as is acknowledged, the water of that river must be excluded from the navigable channel of the canal as much as possible. This can be done by placing three or four weirs, with an aggregate length of crest of 1,200 feet, as far south on the eastern confining ridge as practicable. Their discharge will be led off into the swamps and lagoons immediately to the east of the ridge, and thence by Curena Creek into the San Juan about five miles below the Ochoa dam. In this manner the sediment-laden waters of the San Carlos will be discharged directly, before reaching the San Juan, and the heavy deposits of silt so excluded from the valley. The crest of the weirs will be placed 18 inches below the crest of the Ochoa dam; and in ordinary conditions the surplus waters will escape through these weirs, which will be the lowest outlets.

It is proposed to place the crest of the Ochoa dam (1,250 feet long) at 105 feet above datum, or one foot below the water level of the canal at that point. The discharge under varying conditions of level will then be approximately as follows:

	Cubic feet per second.
At normal level, 106	2,900
At 110 feet level	32,000
At 111 feet level	42,500

The crest of the weirs on the ridge will be placed at 103·5 above datum, and their discharge for the total length of 1,200 feet may be estimated as follows:

	Cubic feet per second.
At normal level	11,300
At 110 feet level	47,700
At 111 feet level	65,300

The combined discharge over the dam and weirs at normal, 110, and 111 feet, levels will therefore be, respectively, 14,200, 79,700, and 107,800 cubic feet per second; that is to say, the maximum floods will be discharged before the level of the basin rises 4 feet above normal. It is assumed as unlikely that the level will ever really rise nearly to that height, as a rise in the San Carlos basin will have the effect of checking the flow of the San Juan, and possibly reverse the current temporarily towards the lake. For the drainage of the San Francisco basin, three weirs, with a total length in overflow of 600 feet, will be built on the bordering ridge, so placed as to carry off the surplus water without producing injurious currents in the basins.

By placing the crests at the uniform level of 104 feet, the discharge will be:

	Cubic feet per second.
At normal level	4,100
At 110 feet level	21,200
At 111 feet level	26,700

In the upper Deseado basin, 300 feet of overflow at 104 feet level, will give the following discharges in round numbers:

	Cubic feet per second.
At normal level	2,000
At 110 feet level	10,600
At 111 feet level	13,300

These provisions are more than ample to meet the maximum requirements in each of the basins, without causing undue current in the short cuts connecting them.

The possible accumulated discharge from the summit level at a given time may, therefore, be put down as follows:

	Cubic feet per second.
At normal level	20,300
At 110 feet level	111,500
At 111 feet level	147,800

It may be confidently asserted, it is claimed, that the second figures will never be reached, and that the crest of the Ochoa dam may be raised above the water level in the San Juan, and yet the highest floods will not reach the 110 feet contour, the weirs being ample to so limit it.

Other provisions, however, have been made with the view to aid in construction, to facilitate repairs, and, as additional precautions, to meet possible contingencies, specially in the series of embankments in the San Francisco ridge, which, as is frankly admitted by Mr. Menocal, is the weakest feature in the whole route. These safeguards consist of a guard-gate, to be placed in the cut connecting the valley of the Machado with Florida lagoon, by which the flow of water from the San Juan towards the San Francisco basin can be shut off, and two anti-friction gate-sluices—one in the San Francisco ridge and the other in that of the upper Deseado—by which the water in these basins can be drained off to 30 feet below

normal level, thus relieving the embankments of that pressure during construction, and enabling repairs to be made in the cuts and embankments afterwards.

These sluices have openings of 25 feet by 20 feet, with the lower sill 30 feet below the normal level. Their capacity of discharge will vary with the head, being 12,500 cubic feet per second for each when the water stands at the 106 contour. By these means, 25,000 cubic feet per second additional can be drawn from the summit level, regardless of the lock culverts, through which 4,500 cubic feet per second more can be spilled.

The middle Deseado basin will be drained by weirs, with 400 feet length of crest, which will be 2 feet below ordinary level, and capable of discharging from 2,700 cubic feet per second to 14,100 cubic feet per second at 61 and 65 feet levels respectively.

In the lower basin 500 feet lengths of weir are provided for, the estimated discharge being 3,400 cubic feet to 17,000 cubic feet per second at normal, and 35 feet level, respectively. Beyond the lower basin the surplus waters are diverted by a short cut into the San Juanillo, and through the latter into the San Juan to the sea.

From Lock No. 1 to the harbour no special provision need be made to drain the adjacent country. The canal traverses a swamp with numerous natural drains, and, being flanked on both sides by high embankments made by the earth spoil, it needs no additional protection.

Drainage (Western Division).

The proposed route of the canal from the lake nearly to the summit of the Divide cut pursues a right line. The Lajas has its source in the hills to the southward, and in its course to the lake intersects the canal line at a distance of 1·25 mile from its mouth. At this point the stream will be diverted through an artificial channel, carried along the south side of the canal, and discharged into the lake. A small tributary, called the Guiscoyol, empties into the Lajas near the point of proposed division of the latter, and will drain the country to the south as far as the highest point of the line; the canal follows the general course of this brook. It will be observed that the Rio del Medio, to the north of the canal, drains the country on that side from the vicinity of the Tola basin to the lake, leaving but a small watershed to be drained into the canal, or, if preferred, by a small ditch diverted to the lake. West of the Divide the canal, including the Tola basin, lies within the watershed of the Grande. With the canal wholly in excavation, no doubt could be entertained as to the necessity of diverting that stream; and careful surveys have been made with that object in view. It was found that to make a diversion channel on the south bank of the Grande would be a work involving difficulties and heavy expense. A safer, less expensive, and more satisfactory plan was found to be the diversion of the stream into the Juan Davila, a tributary of the Lajas, and through the latter into the lake; and a careful

location has been made to that end. (See plan of western division.) The plan requires the construction of a dam near "El Carmen," and the opening of a diversion channel from above the dam, through the valley of Jobite and the watercourse Cumalcagua to the Davila, beyond which no other work will be needed. With the adoption of the basin plan, however, the additional expense demanded by this work seems to be of doubtful expediency. With a large reservoir acting as equalizer of floods, possessing ample facility for discharging the surplus waters, over a weir in connection with the dam, through the lock culverts, capable of discharging 5,000 cubic feet per second, and through the canal itself eastward into the lake, it is believed that injurious results need not be feared by receiving the waters of the Upper Grande into the basin; especially as the extraordinary floods, which seldom occur, are of but brief duration, the usual flow of the stream being insignificant, while for nine months in the year it is nil. The problem admits of a practical and satisfactory solution; and immunity from all danger can be secured, it is claimed, by the expenditure of, say, $1,500,000. From the Tola basin to the harbour the canal traverses a flat valley, with no watercourse to provide for.



THE SAULT



IE LOCK.

Time of Lockage.

The traffic passing through the canal will be limited by the time required for a vessel to pass a lock. This question is of importance, in view of possible delays which may occur. It has been urged that the arrival of ships being affected by wind and weather,—to a certain extent even in the case of steamers, and greatly in that of sailing vessels,—a large number may reach the terminus together, owing to favourable winds, etc. Lesseps made much of this in the days when he still adhered to his sea-level plan at Panama, and he estimated the number of vessels possibly arriving at the same time, at as much as 100 per day. The lockage time he calculated to be at least half an hour, and "there are not a hundred half hours in the day," he said. There seems to be no reason to anticipate any great difficulty in this matter, however, judging from the experiences of the Suez and Sault Ste. Marie canals, for statistics of either do not show that a congestion of traffic is ever likely to be apprehended. In the Sault Ste. Marie Canal vessels of over 3,000 tons capacity are put through the lock under twenty minutes; the whole operation of opening the lower gates, entering the steamer, filling the chamber, opening the upper gates and taking the vessel out from the lock, having been carried out in even nineteen minutes. In the Nicaragua Canal the operation of filling the lock and handling the gates, need consume no

more time,[1] yet forty-five minutes have been allowed (to give a large margin) as the average required for lockage. On that basis, and allowing only one vessel in each operation, the number that can pass the canal in one day is 32, or in one year 11,680, which at the average tonnage of vessels using the Suez Canal would supply an aggregate of about 23,000,000 tons. In 1890, 3,425 vessels of 6,783,187 tons (net) passed through the Suez Canal. The traffic through the Sault Ste. Marie lock, *in the seven months* it was open in 1891, was nearly 9,000,000 tons, and during the same time in 1892, 11,000,000 tons, which is at the rate of nearly 19,000,000 tons *annually;* and the maximum capacity of the lock has not yet been reached. The ocean vessels taking the Nicaragua route will, of course, be much larger than those on the Great Lakes, and the tonnage per lockage will, consequently, be proportionately greater. For this reason a single system of locks has been proposed at the start; and Mr. Menocal believes that, when the business requires it, parallel locks can advantageously be built, and the capacity of the canal doubled. A feature of great importance is that all the locks are connected with large basins, which will greatly facilitate the movement of vessels, and allow the withdrawal of a large volume of water in a short time, without injurious current or marked fluctuations of level in the basins.

The question of water supply is amply provided for,

[1] At the Paris Canal Congress, Sir John Hawkshaw said that he thought fifteen minutes ample time to pass a single vessel through a lift lock.

the maximum amount required for the thirty-two lockages, on the improbable basis of one lock full for each operation,—namely, 127,400,000 cubic feet,[1]—being but one-tenth of the minimum daily discharge of the lake.

To the lake supply must be added the flow of the several tributaries of the San Juan river between the lake and the Ochoa dam, and also the tributaries of the basins forming part of the summit level, which it is claimed would fully compensate for leakage and evaporation.

The Locks.

The locks are to be 650 feet long by 80 feet wide in the chamber. The lifts, as now proposed, will vary from 30 feet to 45 feet; and a change is, I believe, under consideration by which the lift of locks No. 3 may be reduced to 40 feet, and that of No. 2 increased from 30 to 35 feet. These high lift locks must not, it is claimed, be regarded as necessary features of the project imposed by existing conditions. The gradual descent of the Pacific and Atlantic slopes to sea level after leaving the Divide cuts, combined with the highly favourable topography of the country traversed, present many admirable sites for locks,

[1] The water required for lockage is calculated by Mr. Menocal as follows:

For one lockage:	Cubic Feet.
On the east side	2,047,500
On the west side	1,933,750
On both sides	3,981,250
For thirty-two lockages per day . . .	127,400,000

the number of which could be increased so as to greatly diminish all the lifts. Such a plan, however, is not regarded as the best with a view to economy in original construction and future maintenance, or as affording facility to the traffic through the canal.

The body of the lock is to be of concrete, with cut stones in the mitre sills, the hollow quoins, and such angles as need protection from shocks. The gates will be of steel, to be manipulated by hydraulic machinery, of which there is an admirable example at the Sault Ste. Marie Canal, where, in a lock 519 feet long by 80 feet wide, with a lift of 18 feet, the time consumed in opening or closing the gates more than 40 feet high is only $1\frac{1}{2}$ minutes. Another lock, 800 feet long and 100 feet wide, with 21 feet minimum depth of water over the mitre sill, is now under construction there, and the time of filling and emptying the chamber will be reduced by enlarging the size of the culverts.

The proposed dimensions for the locks have been considered in some quarters to be insufficient, in view of the rapidly-growing size of ocean vessels. Both Mr. Charles T. Harvey, one of the Board of Consulting Engineers, who reported in 1889 on the canal scheme, and Mr. W. L. Merry, a well-known authority on the question of the Pacific trade, are of opinion that the locks should be 1,000 feet long by 100 feet broad. This length would be 200 feet longer than that adopted for the new lock of the Sault Ste. Marie Canal, where experience has demonstrated the economy in time

through locking several vessels together—where that is possible.

It seems to me, after full consideration of this matter, that the dimensions proposed by Mr. Harvey are unnecessarily large. It might be as well, perhaps, that Mr. Menocal's dimensions in width should be somewhat increased, but on that point I am not convinced. Locks of 80 feet width seem sufficient, and, speaking from general considerations, I should greatly prefer one 45 feet lift lock to two of 22 feet 6 inches, with 28 feet of water, or thereabouts, on the sills. Where the sides are of rock, or partially so, or even in good ground with properly designed walls, I think that one 45 feet lift would not only be more conveniently worked than two 22 feet 6 inches lifts, but certainly cheaper. The pressures do not appear to me to be forbiddingly great, and there need be no hesitation in undertaking the work.

The plans for the locks, which are voluminous and intricate in detail, have not yet been made public, so far as I know. Mr. Menocal informs me that to work the gates he proposes to use hydraulic machinery similar in design to that so successfully employed in the Sault Ste. Marie lock. It is proposed to fill the locks by two culverts of 13 feet diameter (one on each side of the lock), and by two foot pipes connecting these tunnels with the chamber of the lock near the bottom. The operation of filling or emptying one lock of 45 feet lift will take about nine minutes. In connection with this subject Mr. E. S. Wheeler, U.S., assistant engineer, has published an interesting discussion on the locks of the Nicaragua

canal,[1] by the light of experience gained on the Sault Ste. Marie Canal. Mr. Wheeler is of opinion that the efficiency of a canal in which there is a given lift to overcome, increases with the number of locks. This is contrary to general experience, for the tendency is to decrease the number of locks and increase the lift. He points out that the necessity for a duplicate system of locks has been made conspicuously apparent to those using and depending upon the Sault Ste. Marie Canal, and that the same necessity will exist in the Nicaragua Canal. As regards the contention that a canal without locks, contrary to the usual opinion, is not necessarily more valuable than one with locks, it cannot be said that his argument is convincing.

The exceptional feature of the locks is the great height of the lifts,—especially that of 45 feet,—which, though unprecedented, offers no special difficulties. The total

[1] The conclusions arrived at by Mr. Wheeler are:

1st. The usefulness and value of the canal to commerce are practically the same with or without locks.

2nd. The cost of the necessary locks in the Nicaragua canal would be about 6 per cent. of the total.

3rd. The cost of the locks alone, with a total lift of 110 feet, is least when the lift is 55 feet in each lock, and therefore two locks in a set. It increases very slowly with the number of locks; three locks in a set, with a lift of 36·7 feet each, costing only £6,000 more than two locks in a set.

4th. It is certain that, whatever the amount of traffic may be, a duplicate system of locks will be immediately necessary, so as to make repairs possible without absolute stoppage of the canal, and because vessels will arrive in fleets with favourable winds and temporarily clog the locks.—"Engineering News," June 1st, 1893.

pressure upon the lower gate of the upper lock, when full, will be over 5,200 tons.

The Cross Section.

The minimum depth of water throughout is to be 30 feet, and the minimum width 100 feet. The section adopted will permit of vessels passing anywhere except in the lock chambers and through the two divide cuts. The two sections of the canal, through rock, which it was intended should have contracted sections of 80 feet, in the eastern and western divide cuts, are to be made 100 feet wide, so I am informed by Mr. Menocal. Located at the extreme ends of the summit level, and in close proximity to the upper locks, it was claimed by Mr. Menocal that the slight additional facilities to navigation secured by still further enlarging the dimensions of the channel in these heavy rock cuts, and the inconsiderable gain in time of transit, would not compensate for the larger outlay necessary. It was said that engineers did not attach much importance to the retardation to ships moving at slow speed through a restricted channel, and in proof of this was adduced the fact that, after long experience at Suez, the Corinth and Panama Canals were designed with smaller prisms than that proposed at Nicaragua. It must be noted that the restricted 100 feet sections (in rock), are only two, and widely separated, while the earth sections are divided into many short lengths, separated by broad and deep basins, through which the largest vessels can steam and meet others

without slackening speed. The following table shows the dimensions of the principal ship canals in the world:[1]

Canals.	Depth in feet.	Surface width.	Bottom width.	Length in miles.	
Suez, original dimensions (earth)	26·20	328·0	72·2	100·0	Existing.
Suez, enlarged dimensions (earth)	27·90	420·0	112·9		Enlarging.
Nicaragua (rock)	30·00	100·0	100·0	7·8	
Nicaragua (earth)	30·00	184·0	100·0	9·7	Proposed.
Nicaragua (earth)	28·00	288·0	120·0	9·3	
Manchester (earth)	26·00	172·0	120·0	35·0	Completed.
Manchester (rock)	26·00	130·0	120·0		
Amsterdam (earth)	23·00	186·0	88·5	15·5	Existing.
Corinth (rock)	28·00	77·4	72·2	4·0	Completed.
Panama (earth)	27·80	160·0	72·2	47·0	Proposed.
Panama (rock)	29·50	91·8	78·7		
North Sea and Baltic (earth)	28·00	197·0	85·0	60·0	Completed.
Bruges	26·25	223·0	65·6	6·5	Proposed.

N.B.—The dimensions given are taken at mean low water.

[1] Mr. Menocal says: "The conditions at Suez cannot be compared to those in Nicaragua. There nearly the whole canal is in excavation, and the enlargement is done to enable vessels to meet at any point instead of at certain turn-out places only, which causes much loss of time, and frequent grounding in getting into and out of the turn-outs. The large section is caused by the flat slopes and wide beams made necessary in the loose sand through which the canal passes, and the difficulty of getting suitable material for protecting the slopes.

In 1885 an "International Commission" proposed a scheme for the enlargement of the Suez Canal. It contemplated the deepening and widening in successive stages to be extended over many years, the

The following tables give the length of the different sections of canal in excavation in the lake, the river San Juan, and through the basins:

	Length in miles.		
Canal in excavation, east side	14·870		
Canal in excavation, west side	11·160		
Six locks, both sides	0·759	26·789	Total canal in excavation.
Basins of the Deseado	4·848		
Basin of the San Francisco	11·267		
Basin of Tola	5·504	21·619	Total length of basins.
River San Juan	64·540		
Lake Nicaragua	56·500	121·040	
From the Atlantic to the Pacific		169·448	Total length of route.

capacity to keep pace with the growing demands of traffic. In 1886 the work of deepening was begun, and in 1889 the depth had been increased throughout to 8·50 metres (27·9 feet). The widening was then begun, and is still in progress. It is carried on only on one side of the prism, the increase in width being 15 metres (49·2 feet). In 1890, 3,389 vessels of 9,749,129 tons passed through the canal, through what was then, and is practically yet, the original prism. It is doubtful whether the widening will ever be done on the other side of the canal, except, perhaps, in some of the sharper curves, and if pushed at the present rate, the whole cannot be finished for a score of years."

The dimensions of section as now proposed are:

	Length. Miles.	Width in feet. Top.	Width in feet. Bottom.	Depth. Feet.	Slope.	Area of Prism. Square feet.
From Greytown to Lock No. 1	9·297	288	120	28	3 to 1	5,712
From Lock No. 1 to Eastern Divide Cut	1·423	210	120	30	1½ to 1	4,950
Eastern Divide Cut	2·917	100	100	30	0	3,000
In Eastern San Francisco Basin	1·233	210	120	30	1½ to 1	4,950
From Lake to Western Divide Cut	1·565	210	120	30	1½ to 1	4,950
Western Divide Cut	4·924	100	100	30	0	3,000
Western Divide Cut to Tola Basin	2·519	210	120	30	1½ to 1	4,950
Lock No. 5 to Lock No. 6	1·582	210	120	30	1½ to 1	4,950
Lock No. 6 to Brito Harbour	0·570	Variable	Variable	30	2 to 1	Variable
River San Juan where dredged	27·500	Variable	125	Mean 28	Undetermined	Undetermined
Lake where dredged	14·250	Variable	150	30	Undetermined	Undetermined

The main dimensions of the largest ocean steamers are as follows:

	Etruria and Umbria.	City of New York and City of Paris.	Teutonic and Majestic.
Length	501·6	565	582
Breadth	57·2	63·2	57·5
Depth hold	38·2	42	39
Draught (about)	27	27	27

The dimensions of the greatest war-vessels are: length, 380 feet; breadth, 75 feet; draught, 28 feet.

HARBOURS AT TERMINI.

The Greytown Harbour.

The harbour at Greytown about the year 1833 was still one of the finest harbours along the Caribbean

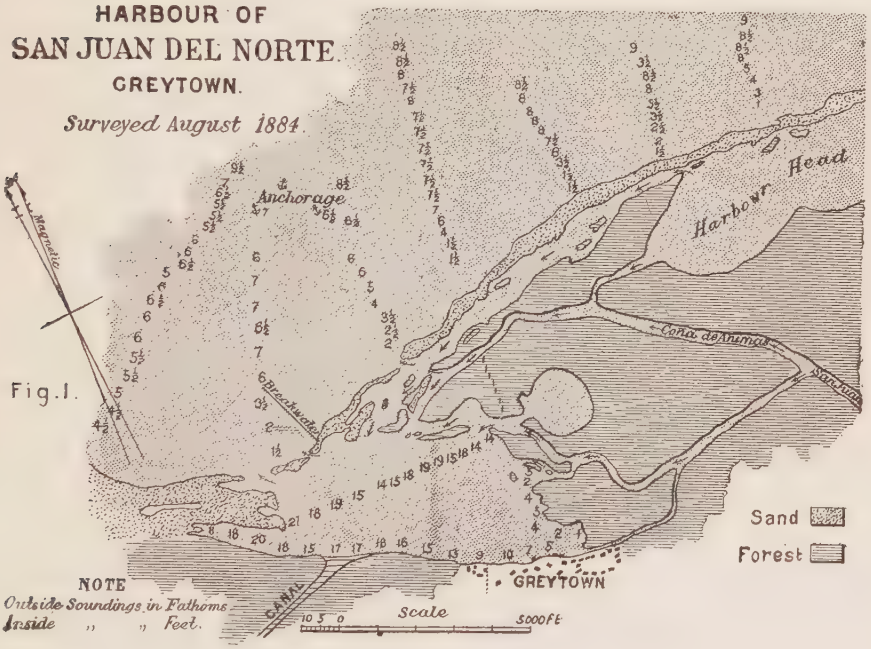


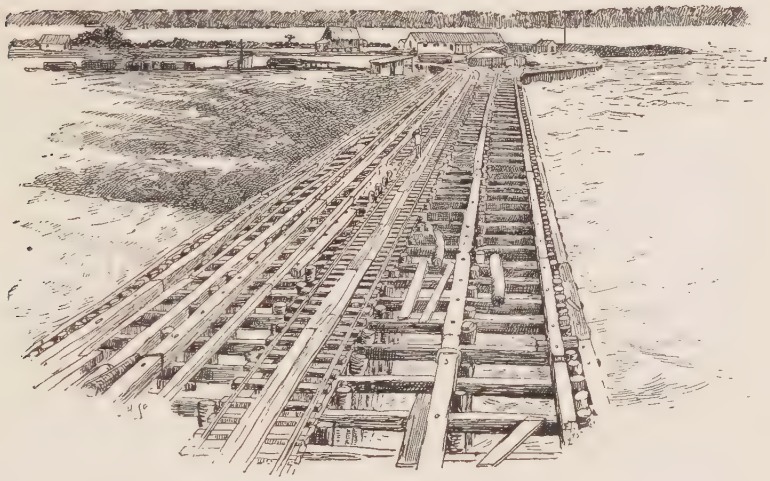
Fig. 1.

coast, and some thirty-five years ago was yet a good and safe port, with an inner bay, having 20 to 30 feet of water inclosed from the sea by a narrow sand spit extending from the main shore on the east to within a few hundred feet of the mainland to the west. The westerly advance of the spit by the shifting sands, under the

influence of the north-east winds and waves (the trend of the coast is nearly south-east to north-west), had been gradually contracting the entrance for a long period. The channel became quite narrow, with only some 25 feet of water opposite the extremity of the spit, and nothing being done to check its progress, the spit continued to encroach, and about 1860, the harbour became a lagoon, separated by a sand-bank from the sea.

To open and maintain a practicable entrance, and generally to restore the harbour, the usual device of building a long jetty normal to the shore line has been adopted. This jetty will project seawards about 3,000 feet to the six-fathom curve, and dredging, under its lee, will be done to form an entrance into the lagoon, which will be deepened over an area of 200 acres to the uniform depth of 30 feet. The shifting sands, it is claimed, arrested by the breakwater, will gradually gather in the east angle formed by it and the coast, and will cause a gradual advance seawards of the new shore line, in the course of time shoaling at the end of the pier, with a tendency to move round and form a new bank across the entrance. This can be avoided, Mr. Menocal believes, by short extensions of the jetty from time to time, as may be required, until the new coast line becomes, in its general direction, perpendicular to the prevailing north-east winds, when no further change need be apprehended, and the permanent restoration of the harbour will have been accomplished. To appreciate the probable action of the jetty, the local conditions must be briefly noted. Firstly, this part of the Caribbean coast is in the heart of

the trade-wind belt, whose average direction, varying indeed within a wide angle, is about N. 70° E. The local trend of the coast line is oblique to this direction, the constant action of the waves producing a shore drift to the north-westward. Secondly, the San Juan receives from the San Carlos and the Serapiqui a considerable



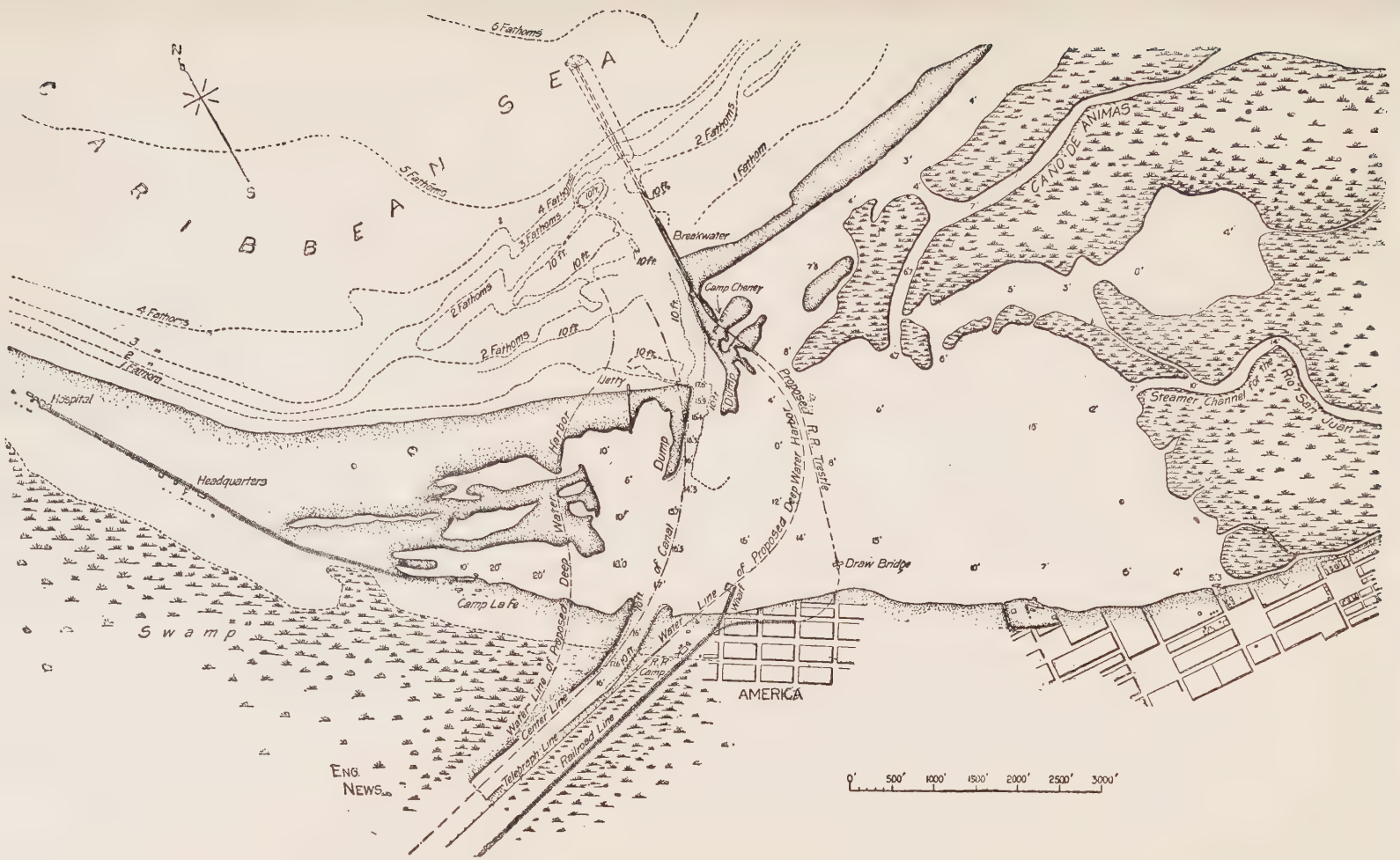
THE BREAKWATER AT GREYTOWN IN 1893.

amount of coarse volcanic sand, ejecta of the Costa Rican volcanoes, washed down from the upper drainage basins of these streams. So large has been this tribute, that the lower course of the San Juan is through broad reaches of sandy flats, while above the San Carlos the river (as mentioned in another place) is quite clear. Thirdly, a large portion of the total volume of the San Juan empties through the Brazo Colorado, whose mouth is unsheltered, subject to bad weather, and

has a shifting and dangerous bar, with a swift current. Fourthly, along this coast, the bottom slopes off into deeper water, with a fair degree of rapidity—a point of great importance. Along the Atlantic coast of the United States, the gradient of the sea bottom for nearly 100 miles is only one fathom to the mile, and the same is characteristic of the Gulf littoral, explaining in a large measure the difficulty in keeping open the passes to the Gulf ports. In marked contrast to these, the Caribbean coast deepens at a rate seldom less than 12 fathoms to the mile, and the steep descent into deep water is frequently at the shore itself. Fifthly, the tides are very slight, seldom exceeding 12 or 15 inches.

Considering these conditions, it appears that while the general action of the winds and waves, and the discharge of sand from the San Juan tend to form bars and shoals northward from the mouth of the river, there are three favourable factors. First, the strong offshore slope. A pier built out to the six-fathom line will yield for some time a sufficient depth for the largest vessels, and as occasion arises the pier can be extended at a reasonable cost. Second, the problem is not complicated by the action of the tides. Third, no sediment is discharged from the harbour entrance to aggravate the sea-borne deposit which will drift round the end of the breakwater, and be dropped in slack water under its lee. To check this, it was proposed to build a second pier north-west of the first and parallel to it, but the plan has been considered unnecessary, I believe ; it may be needed yet, however.

The breakwater is to be built of *pierre perdue*, the



FORMER PROPOSED HARBOUR OF SAN JUAN DEL NORTE OR GREYTOWN

stone to come by rail from the "Great Divide." In order to avoid delay, the canal company built the shore end of the pier of a creosoted timber frame filled with fascines and sand, and whatever material could be obtained, which will have to be replaced by rock, only to be procured when work on the Divide has been begun. The 1,100 feet of the present jetty, a temporary expedient to establish a sufficiently deep entrance channel for the landing of stores and plant for commencing work on the canal, was successful in its object; in the course of a few months a passage being made from the harbour to the ocean, enabling vessels drawing twelve feet of water to enter. The effect was only temporary, as the operations on the canal works were soon after stopped, in 1893, and the whole work will have to be repeated, and the pier carried out to the six-fathom depth, as already indicated.

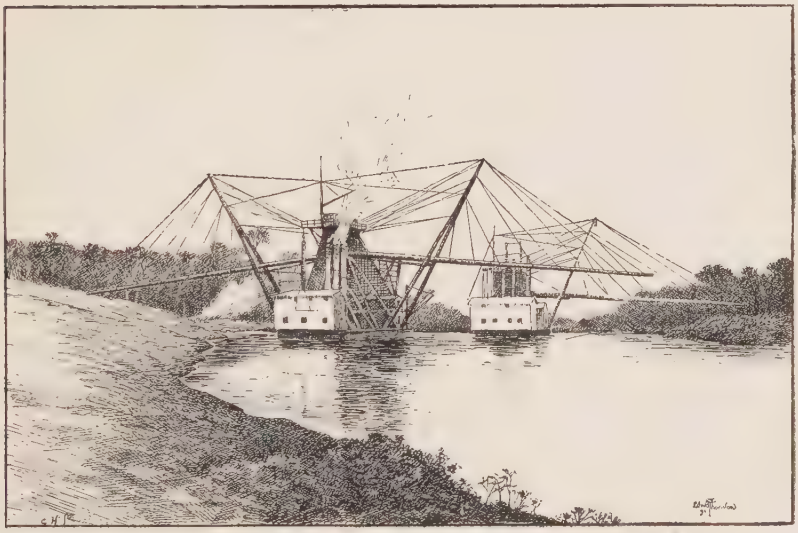
It has been said that this plan would involve a work beyond reasonable limits, while it would practically not overcome one difficulty of the silting up of the harbour,—the insignificant current and volume of water through the old channel, which, inadequate to scour, is more than sufficient to continue the process of silting up. "On the whole," says "Engineering," in a critical review of the project, "it would appear that the only satisfactory, because practical and thorough, remedy would be to reproduce the *status quo ante* 1670,—that is, block up the inner mouth of the Brazo Colorado and re-constitute the old main channel of the San Juan river in its pristine vigour. The volume and velocity of the water then flowing past the harbour of San Juan del Norte would not

only amply suffice to arrest further silting, but would probably, with time and some slight judicious assistance, scour out the area silted up since 1670, and re-constitute the natural harbour." The inner mouth of the Brazo Colorado could, it is maintained in this article, be made to close itself at comparatively slight expense by groynes of piling and mattress-work, deflecting the main current tion its ancient bed, and promoting the deposition of the material in suspension in the neighbourhood of the mouth, the banks thus formed being planted with the never-failing protective mangrove.

Such is the view of a leading British engineering journal, and I will now refer to the opinion of quite the most distinguished harbour engineer the United States has yet produced, namely Eads, who always maintained the extreme difficulty, if not impracticability, of permanently improving the harbour. The restoration of this obliterated harbour, wrote Eads in 1886, is therefore a very different problem from that of any existing harbour on the Atlantic seaboard. "It is, in fact, the creation of a new harbour where none exists. Natural harbours on sandy sea-coasts are always kept open by the flood discharges of rivers, or by the tidal discharges from estuaries, sounds, or other tidal basins. From New York to Mexico, nearly all of our harbours are of this kind, and the almost fruitless attempts to improve them after years of study, and the expenditure of many millions, attest the uncertainty of such efforts. To undertake the creation of a harbour among sandbanks, where none exists, and where neither of the two natural forces are present to aid in

such effort, and to maintain the harbour intact afterwards, must necessarily be more uncertain."

But, while bearing in mind all the difficulties experienced on the Atlantic and Gulf coasts by American engineers, —where practically only at the mouth of the Mississippi have they succeeded in deepening the channel into a



THE DREDGES AT WORK, GREYTOWN, 1893.

harbour,—the important difference of a strong offshore slope must be remembered, which in my opinion largely vitiates the criticism of Eads. It must be taken into account, also, that Eads was the originator and promoter of a rival scheme, the Tehuantepec ship-railway, so his opinion cannot be accepted as impartial.

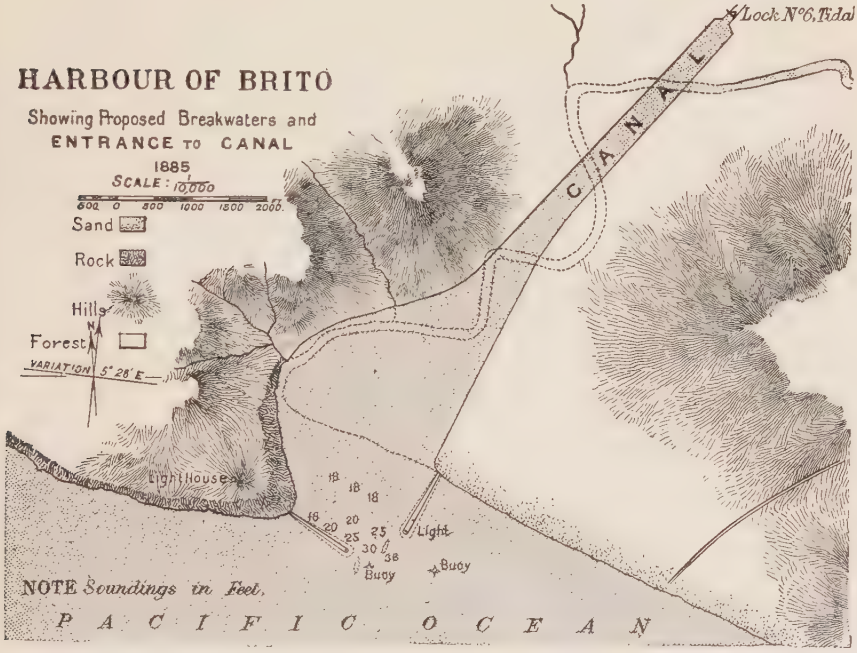
There can be no doubt that the shifting sands constitute a difficulty of considerable importance, and one that will

involve permanent expenditure in the shape of dredging for the purpose of keeping the harbour open. When I was at Greytown, I had ample opportunity for informing myself on this point. I found that the work which had been accomplished in the way of dredging before the cessation of the canal works in 1893, had almost entirely disappeared, and this in the course of a period of less than three years. The dredges, which three years ago were floating in an open channel, now stand high and dry, surrounded by an extensive sand-bank. Not only the residents of Greytown, but the commanders of local steamers, and the stevedores and others, who had known the harbour for many years, were of opinion that great difficulties would be encountered in keeping the harbour open even with the employment of extensive dredging. One stevedore, a very intelligent man, with whom I had a long conversation, gave me a most graphic account of the shifting nature of the sands; how the different channels of the San Juan river had changed with great frequency and suddenness, and how vessels, when touching on this coast, had within an incredibly short time been surrounded and engulfed by the sands.

Considering everything, I believe this creation of a harbour at Greytown to be the weakest feature in the whole canal scheme, and one that requires further serious consideration.

The Brito Harbour.

The point called Brito, by necessity the terminus of the canal on the Pacific coast, frequently spoken of as a harbour, is in reality not even a roadstead.



The proposed plan for the construction of the harbour consists, first, of a breakwater about 1,000 feet long, extending from a rocky promontory projecting from the beach at the western extremity of the range of hills; and second, of another jetty, 850 feet long, nearly normal to the beach and opposite the extremity of the one

before mentioned. The proposed harbour will be partly in deep water confined by the jetties, but its main area is proposed to be excavated in the alluvial Grande valley, the whole forming a deep and broad basin, penetrating 3,000 feet from the present shore line at high water, and about 4,000 feet from the entrance. As an extension of the harbour, the canal itself will be excavated at sea level with an enlarged prism for the distance of 3,000 feet inland, where the tide lock has been located. With the basin as designed, and the prolongation of the sea level through the canal, sufficient tranquillity will be secured at the lock and in the harbour, it is believed; but should this prove not the case, an enlargement of the main basin by dredging in soft material would be a question of comparatively small expense. The breakwaters are to be of *pierre perdue*, the material to be obtained from the rocky promontory, or from the western Divide cut. The harbour has an area of 95 acres on the bottom, or excavated portion, and with the sea level section of the canal a total of 103 acres of water, and 30 feet deep, exclusive of the slopes.

The selection of Brito as the Pacific terminus was a matter of compulsion, for the canal from the lake through the Pacific Divide has been located so as to involve a minimum of excavation, and elsewhere the cost would be prohibitive. As the canal opens directly upon the ocean, it must be constructed by means of breakwaters, to shut out the swell, and by dredging to furnish sufficient space for vessels awaiting entrance. As there is no drifting sand here as at Greytown, and as the bottom of

the Pacific slopes here more rapidly towards deep water, there will be no difficulty as to construction.

The harbour, though small, should prove sufficient, and the roadstead of San Juan del Sur, some eight miles distant, will prove of service in event of there being any crowding of vessels awaiting canal service.

Chapter V.

THE ENGINEERING PROBLEM.—PART II.

CLIMATE. RAINFALL. LABOUR. VOLCANOES.

AMONG the chief conditions affecting the construction and maintenance of the canal are the rainfall and climate. The opponents of the project have maintained that the main features of a tropical climate as experienced at Panama and Colon are the same as at Brito and Greytown, while those interested in the Nicaragua scheme have insisted upon the perfect healthiness of that route throughout.

Let us see how the facts stand.

The mean temperature at Greytown in 1890, as recorded by the canal company's chief surgeon, was 77·25 degrees, the range being confined between 70 and 90. The average monthly rainfall in the same year was 24·75 inches, and for the year 296·94 inches; in 1891 there were 214·27 inches; in 1892, 291·15 inches. The maximum daily rainfall was a little over 6 inches in twenty-four hours.

Now, there is no disguising the fact that this amount of rainfall is a very serious matter. It is surpassed in

America only on the Mexican Gulf coast and in the West Indies, in Guiana and on the Brazil coast; while in the East, in coastal countries, it is exceeded only in parts of Burmah and Indo-China. It is impossible to compare the statistics of the rainfall at Colon with that of Greytown (the two Atlantic ports), because no reliable records as regards the former exist; but, in face of the usually quoted figure of 100 inches, it is safe to assume it to be very similar to Greytown, namely, close on 300 inches maximum. This heavy rainfall is confined, be it noted, to the low-lying region next the Atlantic, the rainfall in the lake region being as little as 45 inches, so I was informed by Mr. Menocal, and certainly not more than 60 inches [1] in the neighbourhood of Rivas, that is, on the Pacific slope. Practically no rain falls there from November to May, and little on the table lands east of Lake Nicaragua.[2] The nights are cool, the sky cloudless,

[1] Dr. Flint, a gentleman unconnected with the canal company, kept records at Rivas, showing from 1880 to 1889 a maximum rainfall in 1886 of 87·21, and a minimum in 1885 of 34·54.

[2] Andagoya says :—"In all these provinces, from Nicaragua to Darien, there is not half an hour between day and night during the year; and the summer lasts from the beginning of December to the beginning of May. During this time the winds blow from the north and north-east; it does not rain, or become colder than in winter, and the people are healthy, and it is a marvel if any are taken ill. The winter begins in the early part of May, and lasts till the end of November; and in September and August it rains more than in the other months. It is hot, and there is thunder and lightning. In this season people fall sick. During all the season the wind blows from the S.S.E., until some shower causes it to change. On this coast of Panama, as far as the gulf of San Miguel, streams of fresh water enter the sea at every quarter or half league."

and the season is the healthiest of the year. It has even been likened to that of a northern summer.

It is claimed that the amount of precipitation decreases rapidly from the Atlantic coast to the interior uplands; but this seems most improbable in view of the usual conditions, and here the physical characteristics must be understood.

Nicaragua may be divided into three parallel zones. The most easterly, where the warm rains from the Caribbean Sea fall, comprises the primeval forests of the Atlantic seaboard, and the interior of the Mosquito coast,—a region barely settled, where civilization is only now beginning to penetrate from the west. The second includes the uplands of the central water-parting, on which open *savannas* prevail. The third lies between the great lakes of Nicaragua and the Pacific coast. Not merely in elevation, but in the character of the soil, is the last widely different from the other two regions, consisting of the more recent volcanic tufas and lavas, while in the east are found stratified rocks of the oldest formations, crystallized schists, quartz, and dolerites.

Lying between the elevated mountain masses of Costa Rica on the south, and of Honduras on the north, the average elevation of the mountains of Nicaragua is hardly 1,000 feet, and of the lakes as little as 110 feet above sea level. Owing to this depression—the lowest in the Cordillera—it is the natural channel of the north-east trade winds which, entering from the Caribbean Sea, sweep over the Eastern Divide, pass across the lake, and disappear over the western hills. Of the rains on the

Atlantic slope, the greater portion of the moisture is precipitated at the foot-hills before the lake region is reached, where the drier lands, with a raised temperature, absorb the moisture. It is reasonable to believe that the trade winds precipitate the surplusage of their moisture on reaching the slopes of the Cordillera, where the obstruction in their course is met with.

The route would seem to be free from dangerous endemic diseases, and also from frequent epidemics. Greytown has had, like New York, New Orleans, and other cities in the States, its epidemics of cholera and yellow fever, but not during the past twenty-five years. Intermittent fever is not infrequent, but is not serious or fatal where proper care and precautions are observed. It is probable, unless the most careful sanitary precautions are taken, that yellow fever may become endemic during construction, and a proper water supply brought in by pipes from the Divide, with a thorough drainage of the town are indispensable. To preserve health when Greytown is filled by a large body of labourers, and the inevitable host of camp followers, it should be placed under martial law, or something closely resembling it.

It has been said that the rainfall and its probable effects have not received proper consideration, and I am forced to the conclusion that the climatic difficulty has not been sufficiently appreciated. The fact, which there is no reason to doubt, that while operations were in progress next Greytown, before 1893—the preliminary period of construction—the workmen did not suffer from fever and dysentery to any unusual extent, does not

prove that this will be the case later on, when the works are in full swing. It would be idle to contend that very serious difficulty will not be encountered from the climate. While the lake region and Pacific slope are healthy and superior to Panama, the country embraced between Ochoa and Greytown, in my opinion, presents much the same climatic difficulties. Here occurs the dredging of the channel through the stagnant swamps of the San Juan delta, as well as the work in the "Great Divide" and the Deseado and San Francisco basins through dense tropical jungle with a rich (but rotten) surface soil. The past history of the Panama canal and Panama railway, with their enormous expenditures of life, makes it imperative to treat very seriously this question, and to take every possible precaution. The climates of both Colon and Panama have greatly improved since the canal days, be it remarked.

One point deserves notice, that, while the injury to health may be mitigated by the employment of machinery with a minimum of labour, the works will probably considerably affect the now healthy uplands, as the liberated miasmata will be swept inland by the trade winds, the great health-provider.

A large margin for contingency will, in my judgment, have to be provided for to guard against the enforced delay in execution and increase in cost.

Labour.

Closely allied to the question of climate is that of labour. A large proportion of the work will be executed by machinery, most of the excavations in earth, rock drilling, lifting and hauling, being done by steam and compressed air, but a large amount of labourers will be required, as many as 15,000 probably.[1] The labouring classes of Nicaragua are said to be active and enduring, under exposure to the local climatic conditions; but they are only useful, as regards the canal work, for clearing the forest. As many as 6,000 labourers can be obtained from the Central American States, according to Mr. Menocal, but this seems a matter open to grave doubt. The supply, too, from the Gulf region of the United States—where the climatic conditions are in many respects similar to those of a considerable portion of the canal line—it would hardly be wise to rely upon. The official reports make no allusion to any other source of supply. There can be little doubt, however, that Jamaica and other islands of the West Indies, will contribute the greater portion of the labourers required. It was found that a Jamaica negro, while performing little more than one-half the work done by the best labourer in the States, costs also but one-half the wages and subsistence of the white man. The value

[1] In 1888 the number of workmen on the Panama Canal was close on 12,000, chiefly negroes from Jamaica and other West Indian islands, and 20,000 were wanted; the pay was 1½ Colombian dollars per day (3*s.* to 3*s.* 9*d.*). Few Chinese could be got, their experience on the Panama railway having been discouraging.

obtained was the same. It is possible that the British Colonial Governments may place some obstacles in the way of obtaining a large supply of West Indian negroes, as the experience of the treatment accorded them on the Panama works was most unfavourable, and serious expenditure was entailed to bring the destitute and dying negroes back to their homes. The existing prejudice against canal works in the mind of the West Indian labourer will have to be removed by reasonable agreements, fairly and justly carried out. Chinese labour will probably be difficult to get, nor do they stand the climate as the West Indian negro does. The heaviest work—on the "Divide"—is situated on the most elevated and healthy portion of the line. Most of the work between Greytown and the Divide will be done by dredges, requiring few men, who, wherever possible, will be housed on the height, and conveyed to their work by rail. It is eminently a country for the employment of machinery in the execution of the work. In the case of skilled imported European and American labour, on the eastern side especially, allowance will need to be made for a change northwards, for a month or so annually.

Every provision necessary seems to have been made while the works were in progress for the sanitary arrangements, and police organization and supervision. The hospital service was well planned, while efficient rules were framed, and strictly enforced. The workmen were kept in camps, and both housed and fed by the Company. This care of the men, before the need for a hospital

arrives, is a matter of the first importance, and it is only just to say that this has been thoroughly recognized by Mr. Menocal.

Volcanoes and Earthquakes.

This question has been very lightly passed over by the supporters of the canal scheme, while in the various stages of the discussion of this project in Congress and elsewhere, the existence of volcanoes in this region has played a prominent part in the speeches of adverse critics.

In the Managua district earthquakes are felt from time to time, craters of extinct volcanoes exist in the surrounding country, the rocks in the "divides" are of volcanic origin, and an active volcano is situated on one of the islands in the lake,—so much is certain. But the general consensus of opinion of those competent to judge is that nothing is to be feared from this cause. A strong support of this view is the fact that earthquakes have done but little harm to Fort Castillo, which was built by the Spaniards in 1575, and that the cathedral at Leon and other old buildings have stood for several centuries without injury. Volcanic eruptions and earthquakes occur in many parts of the world, including the United States and Mexico, and some of these,—for instance in San Francisco and Charlestown,—have been severe and destructive, but none has been considered an impassable barrier, or even a considerable obstacle, to the progress of engineering development.

Nicaragua is undoubtedly a volcanic region, as indi-

cated by its Indian name Cuscatlan, "the land that swings like a hammock," and Humboldt has pointed out that "there is no spot on the globe so full of volcanoes as this part of America from the 11th to the 13th degree of north latitude."

An alarming account was given by the senior Senator



FORT CASTILLO, SAN JUAN RIVER.

for Minnesota in the course of a speech delivered in the United States' Senate in 1891, from which it would appear that in 1835 there was an eruption of Cosegüina, on the Bay of Fonseca, with accompanying earthquakes,[1] one of the most appalling events of that character in

[1] M. Froebel says this earthquake closed the channel of Tipitapa (between the lakes).

modern times, the sounds as of the earth breaking up being heard at places in Guatemala, and at Kingston, 400 and 700 miles distant respectively. In 1841 the town of Cartago, in Costa Rica, was nearly destroyed by an earthquake. In May, 1844, a succession of earthquakes occurred in Nicaragua which lasted for several days, and Rivas was much damaged, the water of the lake rising and falling.

In 1867, a new volcanic cone was formed in Nicaragua, twenty-four miles east of Leon,[1] and at the same time 282 shocks of earthquake were felt in the West Indies. In 1870, on the 26th July, there was an earthquake in Managua simultaneous with activity in the volcano of Momotombo, and on 27th and 28th July there were two earthquakes in the adjoining republic of Salvador. San Salvador itself was entirely destroyed 19th March, 1873.

On the 19th June, 1883, from the volcano of Omotepe (in Lake Nicaragua) lava flowed for days, and spread over

[1] The "Panama Star and Herald" gives an account of this: "On the afternoon of the 14th December, 1867, the people in that city (Leon) were startled by the sudden and almost simultaneous breaking out of a number of volcanic vents on the western or Pacific slope near the base of the long extinct twin volcano of Rota. . . . The first intimation was a low, rumbling sound, like distant thunder, shortly followed by quick, sharp, and continuous reports, resembling the roar of a not far-distant battery of heavy artillery; these reports and subsequent ones were distinctly audible on still nights at the port of Corinto. On the night of the 14th there was revealed a sight which but few people ever witnessed. Two large volcanic fires, with several smaller ones scattered about on the plain, shed their lights on the surrounding country, and even lit up with a warm glow the towers of the Leon cathedral."

the island. The eruption was accompanied by earthquakes, and the whole population of the island took refuge on the mainland. For more than a century it had been quiet, but during the last few years it has been active, so much so as on one occasion to nearly destroy the town at its base.

An eruption of Momotombo[1] occurred on the 22nd May, 1886, and Rivas, and several other towns experienced an earthquake simultaneously. Of this eruption it is said that it was accompanied by severe earthquake shocks, during which the whole area of Managua sank 3 feet, completely destroying all the most important buildings and many lives.[2]

In 1888, on the 30th September, Poas volcano was in eruption, and destroyed the capitol and cathedral in San José, the capital of Costa Rica.

It must be observed, however, that none of the volcanoes except Omotepe are within a distance of thirty miles from the canal route, and in the opinion of Major Dutton—an authority on this subject—the safety of the canal will be in no wise threatened by them.

At a remote geological period the isthmus consisted merely of a chain of islands similar to the Antilles. The

[1] "The volcano of Momotombo, like a giant warder, stands out boldly into the lake, its bare and blackened summit, which no man has ever reached, covered with a light wreath of smoke, attesting the continued existence of those internal fires which have seamed its deep sides with burning floods, and which still send forth hot and sulphurous springs at its base. Within the lake itself rises the regular cone of Momotombito."—SQUIER, vol. i.

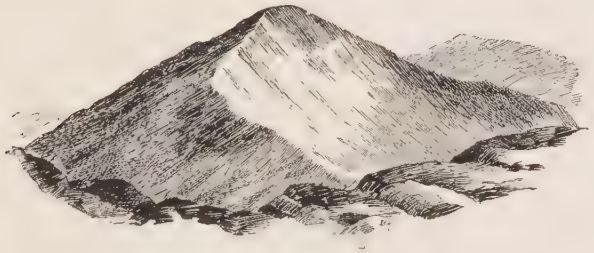
[2] Kneeland, "Volcanoes and Earthquakes," pages 158, 159.



MOMOTOMBO ON LAKE MANAGUA.

straits between them were gradually filled up, but their position can still be traced in at least two places, *i.e.*, Tehuantepec and Nicaragua.[1]

The physical history must have been most varied and convulsive, and the inference to be drawn from geological evidence, corroborated by early Indian tradition, is that, in the recent geological history the first change was wrought by a seismic convulsion which thrust up the present basin of the Lake of Nicaragua some 150 feet or 200 feet above sea-level. This upheaval



THE VOLCANO AT IRAZU, COSTA RICA.

was followed, or accompanied, by the formation of all the volcanic cones now existing in that basin, *i.e.*, Omotepe, Madera, and Zapatera in the lake, Mombacho and Masaya at the north-west end, and eight smaller cones to the north and north-east of the present lake. The two lakes then formed but one, which drained into the Gulf of Fonseca. A subsequent convulsion in the

[1] "Mais ce détroit, ou plutôt ces détroits, car il y en avait plusieurs, la nature les a fermés depuis l'époque tertiaire et c'est à l'homme qu'il appartient de les rouvrir."—RECLUS, *Nouvelle Géographie Universelle*, vol. 17, p. 19.

dividing ridge to the eastward of the lake produced the valley of the San Juan river.

The probability is, that for many centuries a continuous water-way existed, as stated by the Indians to the early Spanish explorers, from the Gulf of Fonseca along the line of the "Estero Real" (the remains of the Pacific inlet), through Lake Managua and the channel of Tipitapa, through Lake Nicaragua and the newly-formed gorge of the San Juan river, through the old valley of the Serapiqui into the Atlantic, the drainage being conducted both ways from the bigger lake. Subsequently, and at a period not far removed from the epoch of the Spanish discovery of America, a further volcanic convulsion occurred, by which the communication with the Pacific was cut off by the nine volcanoes of the Marrabios Range (*e.g.*, Momotombo, etc.); the two lake basins were raised, and were compelled to drain solely in the Atlantic direction. Gradually the channel of the San Juan river through the dividing ridge was worn down by the water, the rent deepened by further volcanic action, and the level of the lakes lowered, but the flow between the lakes being less erosive, Lake Managua has remained permanently the higher of the two by 20 feet to 30 feet. The area of the lakes has also shrunk considerably, and the edge of the water, instead of reaching right up to the foot of the encircling mountain range, has receded in places 20 and 30 miles, leaving fertile terraced plains in evidence of its former occupation, and this, again, is confirmed by Indian tradition.[1]

[1] "Engineering," April, 1893.

The Lake of Masaya seemingly was the mouth of an extinct crater. All its surroundings are of volcanic origin, its western side being flanked by the cone-shaped and destructive volcano of Masaya,[1] whose lava-streams have covered the sides of the old crater, and formed an oblique incline on the banks of the lake. With this volcano are connected Los Marrabios, a group of hills stretching from Lake Managua, north-west to the Gulf of Fonseca, where are probably concentrated more volcanoes than in any other spot on the globe. That the volcano is a recognized Nicaraguan characteristic is shown by the fact that a

[1] Oviedo visited the volcano of Masaya in 1529, and gave a full account of its condition and appearance at the time.

Andagoya says, p. 34: "In this province there is a volcano from which smoke constantly issues, and at night it may be seen for three leagues round. At night it looks like flame, and in the daytime like smoke. The mouth is round like that of a well, and half way down there is a ledge round the mouth; as when they make a well, the upper half is wider, and the lower half, being faced with masonry, is narrower, and ends upwards in a sort of ledge. At times the fire comes out with great fury, and sends forth many stones, that look like great fiery pieces of iron. I have seen this, and it seems that the fire has worked on them, and left them as cinders. They destroy the herbage for half a league round; and the Indians to appease the fire so that it may not come and destroy them, bring a virgin there, at certain times of the year, to offer her up, and they throw her in. They are then joyful, for they believe that they are saved. In this sacrifice, and in those to the statue, many people die every year. A friar, they say, entered as far as the ledge half way down the mouth, and thence he looked down and saw a certain thing like metal, of the colour of fire, and he let down a link of an iron chain by a rope, but when he drew it up he found nothing. I do not think it can be gold, because gold is cold, and if extreme force was not used, very little could be broken off. I believe that the fire contains what there is in it, and does not receive anything from any other source."

facsimile of this range forms part of the national coat-of-arms, and appears upon the Nicaraguan silver coins and the postal stamps. The lava-fields extend in places for miles. During the day a glistening movement of atmosphere is seen on these fields, while at night the whole district is lit up by a bluish flame, at times flashing across the land, at others leaping up like a column of fire, and then mysteriously disappearing; the natives call this phenomenon *el baile de los demonios*, or "the devils' dance."

The exemption of the Tehuantepec and Panama routes from the dangers attaching to possible seismic action has been put forward on various occasions by their advocates. The danger may never materialize, or it may, and endanger or destroy part or all of the canal works. All we know is that volcanic action is not extinct, and that its effects, at no distant date, have been great. Under the circumstances, nothing can be done by the engineer to provide against the possible dangers of great convulsions, and provision can only be made, especially in the selection of the sites of the locks and their foundations, against the ordinary effects of minor earthquakes, such as occur not only in Central America, but in many other parts. The ordinary rules adapted to the choice and treatment of foundations are inapplicable here, and guidance must be sought in the small amount of information possessed of the action of earthquakes and of the transmission of seismic motion generally. This applies to such works as the "Divides" (to which attention has been drawn elsewhere), as well as to that of the locks.

TIME OF TRANSIT. COST. TIME FOR COMPLETION. MATERIALS FOR CONSTRUCTION.

Time of Transit.

In estimating the time of transit through the canal from the Atlantic to the Pacific, the speed in the excavated sections of the channel has been limited to 5 miles an hour, although in the Suez Canal steamers of 6,000 tons are allowed to move at 6 miles, and smaller vessels at the rate of 7 or 8 miles an hour. In the lake and in the greater part of the river San Juan, vessels will be able to travel with unrestricted speed.

The total time of transit is estimated at 28 hours,[1] the passage through the locks, the narrow and broad sections, the river basins, the river and lake, all being carefully computed at varying speeds. I am inclined to regard Mr. Menocal's calculation as reasonable. It is right to mention, however, that French engineers have disputed the accuracy of this forecast, and are of opinion that the time taken would be 36 hours in the case of ordinary

[1]

	H.	M.
26·030 miles of canal at 5 miles an hour	5	12
21·619 miles in basins at 7 miles an hour	3	05
64·540 miles river, San Juan, at 8 miles an hour	8	04
56·500 miles in lake at 10 miles an hour	5	39
Six lockages at 45 m. each	4	50
Allow for detentions	1	30
Total time of transit, say	28	00

vessels, and, if navigation were suspended at night, three days. As the restricted water-way (which would have involved a further loss of two days' time for big ships) has lately been increased from 80 to 100 feet, it is unnecessary to discuss further the objections which were maintained in connection with that feature.

Cost and Time for Completion.

Mr. Menocal estimated the cost of the canal[1] without interest or financial contingencies at about £13,000,000 ($65,000,000), but his calculation was in 1889 revised by a committee of consulting engineers appointed for the purpose, and raised to, say, £17,560,000 ($87,799,570). Two points in connection with this estimate deserve notice; the board never visited the ground, and they expressed an exceedingly cautious opinion on the subject, as will be seen from a perusal of the document, to be found in the appendices. Without personal inspection no report in my

[1] The following prices per cubic yard were adopted:

Dredging, 20 cents and 30 cents. Excavation in earth, 40 cents. Excavation in rock, $1.50 and $1.25. Excavation under water, $5. Embankments, 40 cents to 70 cents. Concrete, $6 to $10. Rock fill, 50 cents. Breakwater, *pierre perdue*, $1.50. Grubbing and clearing, $100 per acre. Railroads, $60,000 and $25,000 per mile. Telegraph, $600 per mile.

The estimate of $65,084,176 was "inclusive of 25 per cent. for contingencies, but exclusive of interest, commissions, and other charges not coming under the cognizance of the engineer, and on the basis that the work will be prosecuted with vigour along the whole line and without intermission."

judgment would be of much value, and in this case the report—made in New York by engineers who moreover, I believe, never had experience of work in the tropics—is further weakened by the qualifications, especially that implied by the word "unless." It is fair to add that their figures have so far not been seriously challenged, except, perhaps, upon the ground that insufficient allowance has been made for the cost of financing and payment of interest during construction, an item which will be reduced to a minimum should the United States Government take up the project. After making the allowances alluded to, the cost is now assumed to be under £20,000,000 ($100,000,000).

Now, with regard to this question of cost, I am of opinion, as already stated, that the climatic difficulties have not been sufficiently appreciated, and in connection with this subject attention is drawn to the fact that Major McFarland estimated the cost of a canal in 1874 at $140,000,000,—along another route, partly, it is true, but mainly the same line with the same termini—and heavier allowance for contingencies was made all through, as evidenced by his estimates for the harbours at Greytown and Brito. Again, we know from experience how frequently original estimates are enormously exceeded, as witness the Suez and Manchester Canals, where the estimates were exceeded by about 300 per cent. India, Burmah, and other tropical countries furnish many examples of a similar character. To compare the original calculation of cost with the uncompleted work at Panama would serve no useful purpose, but a glance at some of

the various estimates will show how greatly these have varied.[1]

Taking into consideration all the circumstances—especially the climate, its debilitating character generally, and the excessive rainfall on the eastern side, the volcanic question, the difficulties as regards labour—I am inclined to think that £30,000,000 in genuine expenditure on the work will be found nearer the mark than the present estimate. If engineers are liable to under-estimate the cost in countries, even those non-tropical, where the climatic and other difficulties are well ascertained, is there not need to provide largely for the unknown in a country such as Nicaragua? The individual rates in every case seem sufficient, but in such cases *c'est l'imprévu qui arrive.* In both the Manchester and Suez Canals, speaking in general terms, the rainfall is slight and the climate very good, undoubtedly a great contrast to the work under discussion.[2]

[1] M. Wyse in 1879 . £17,080,000 (427,000,000 francs).
Paris Congress in 1879 £41,760,000 (1,044,000,000 francs).
Lesseps Commission, Feb. 14th, 1880 . £33,720,000 (843,000,000 francs).
M. de Lesseps personally, Feb. 27th, 1800 £26,320,000 (658,000,000 francs).
Rectified estimate, Sept. 1880 . . . £21,200,000 (530,000,000 francs).
Latest estimate, to complete the canal, 1895 £36,000,000 (900,000,000 francs).

[2] As I am unable to agree with the estimate of cost put forward, it may be well to note what Mr. Menocal says on this subject:—"The experience and information gained in the work already done in dredging to a depth of 17 feet over a mile of canal through the swamp back of Greytown;

In the matter of maintenance, too, the same considerations apply, and the necessary expenditure will prove, I believe, to be more than seems to be anticipated. The Suez Canal furnishes no good guide, for that work (a sea-level open cut through a sandy country) is of a totally different character to Nicaragua (a lock canal, controlling an enormous volume of water, much through rock). The maintenance at Suez costs about £300,000 per annum: the estimate for the purpose at Panama made by the last commission was £400,000.[1] The cost at Nicaragua, assumed to be £360,000 ($1,800,000), will probably be not less than £400,000 a year, but it would be unwise to speak positively on this subject.

The time required to complete the canal was originally calculated to be six years. A considerable amount of work, it is true, was accomplished on the canal before the cessation of operations in 1893, but much of that has been lost, and six years' time from the recommencement would appear under the existing circumstances to be reasonable.

in building 12 miles of standard gauge railroad through these so-called impassable swamps; in the construction of a part of the breakwater at the harbour entrance; in clearing a large part of the canal route and in other preparatory works, all of which have been done inside of the estimates and without meeting greater obstacles than had been anticipated, convinces me, and, I believe, should convince any other unprejudiced critic that the whole work can be executed within the estimated time and cost."

[1] Maintaining the works in order £220,000
Administration on the isthmus £104,000
Central administration £ 76,000

The period in which the canal can be finished is controlled by the time needed to complete those important works without which the traffic cannot be established. It has been pointed out that the Ochoa dam can, in Mr. Menocal's opinion, be finished in four or five years, and the Tola dam, the locks, and harbours can certainly be completed in that time. The Western Divide contains about 11,000,000 cubic yards of rock and earth, but the excavation is about nine miles along, and the greatest depth only 72 feet; consequently (as already noted) this work is of less magnitude than the Eastern Divide, in which a probable total of about 12,000,000 yards will have to be extracted and removed from a trench less than three miles long, at an average depth of 141 feet, and a maximum of 328 feet. This latter work therefore decides the limit of time within which the whole route can be opened. The problem is thus stated by Mr. Menocal :— "On the basis of 12,000,000 cubic yards, of which two-thirds will be rock, assuming six years' continuous work, at the rate of ten hours a day, there will be an output of 6,700 cubic yards per day. This amount of material can be lifted and landed on the cars by 22 overhead wire cables at the moderate rate of 300 cubic yards each per day, and can be hauled to the 'dump,' or place of destination, by 112 train loads of but 120 tons each, or say 11 train loads an hour. About one-eighth of this will go as far as Ochoa, for the construction of the dam, and about the same amount for the breakwaters and the locks, Nos. 1, 2, and 3. Of the balance, one-half will probably be needed for the embankments in the valleys of the

Deseado and San Francisco; and the rest can be deposited in the vicinity of the excavation, but a few hundred yards away. Allowing for repairs, accidents, and other unavoidable delays, it may be estimated that a plant comprising 30 cableways, with attachment and machinery, 50 locomotives and 1,000 cars will be ample for this work. The above would be rather a heavy traffic to handle, if sent over the main line; but, distributed as suggested above, with a large portion of it sent off on spur tracks from both sides of the three miles of excavations, to be deposited in the numerous ravines and valleys in the vicinity of the work, it does not look unmanageable. But, if need be, work can be carried on without interruption by the aid of electric lights. Therefore, as regards the disposition of material, six years seem to be ample; and, as to the work of digging and blasting, it will be admitted that the mind capable of organizing and carrying out the former will have no difficulty in mastering the latter. Consequently, the previous estimate that the canal can be completed in six years after the works are fairly started is adhered to."

Sir W. Jackson, the contractor on the Manchester Ship Canal, removed continuously for several months, on a section two and a half miles long, 20,000 tons of rock per day. This was done with one shift of nine hours, and included blasting, loading cars, hauling and dumping. The plant consisted of about 50 locomotives, 1,400 cars, and 45 miles of track. He was much restricted and embarrassed in his operations by limited areas for dumping his material, which will not be the case on the Nicaragua Canal.

The question of forfeiture of the concession, the full text of which is given as an appendix, is dealt with in Clause 53 as follows: "The present concession shall be forfeited through (1) failure on the company's part to comply with any of the conditions in Clauses 8, 46, 47, 48 and 49; (2) interruption in the working of the canal, after opening, for six months, *force majeure* excepted. Forfeiture being declared for any of the above causes, the 'waste lands' ceded under this contract shall revert to the Republic, whatever be their condition, without compensation, though buildings should have been erected thereon, save and except those lands which may have been legally parted with by the company to private parties, provided that they shall not have been parted with within the six months immediately preceding the date on which the company shall have become legally subject to the prescribed penalty (of forfeiture)."

In the recent debates of the United States Senate it was stated that the ten years granted counted from the time of the concession, or actual possession under it; namely, from 1887. But the company had two years in which to make preliminary arrangements, and ten years thereafter to complete the canal; the concession cannot expire therefore till October, 1899.

To afford facilities for the rapid execution of the work, railroad lines have been projected from Greytown to the river San Juan at Ochoa (a distance of 37 miles) and from the lake to Brito (18 miles). Of the former line 12 miles were finished before suspension of the works, from Greytown towards the Divide, and are still in fair

condition. When the work is in full swing, as soon as the "Divide" is reached, the railroad will be extended across the Greytown lagoon to the breakwater at the harbour entrance, where the rock from the excavation will be brought and dumped directly, as at Galveston, Texas.

Materials for Construction.

Timber, generally of fairly good quality, is found along the entire route. On the eastern side it is intended in many parts to use the local timber grown on moist ground, merely for temporary works during the construction, the rest being imported from the Southern States and creosoted, when necessary. The creosoted timber has failed altogether to resist the teredo, and another kind of timber, more heavily creosoted, will be required. On the western side the wood, grown on much drier ground, is of superior quality.

The rock, which is to be so largely used in the dams, weirs, and breakwaters, will come from the Divide cuts, and is of a suitable quality. Lime of fair quality is procurable on the western side, but imported cement will have to be largely used for the concrete in the construction of the locks and other works.

A stiff, impervious clay, an excellent material for the embankments, is found at all their sites and in all the canal cuts, except where rock exists. Suitable materials for building embankments and for the works of masonry are therefore abundant.

Comparison with Suez.

Comparisons have been somewhat indiscriminately made between the Nicaragua and the Suez and Panama schemes, especially as regards the engineering estimates of time and cost of construction, on the assumption of a similarity of conditions furnishing a fair basis of comparison. But in reality there is no ground for comparison. The brief account given of the main features of the Panama Canal, and a very cursory consideration of the Suez enterprise, will support this contention.

The Suez Canal[1] is a water-way, excavated mostly through a sandy desert connecting two tide-level seas. The variation in the tides of the Mediterranean is only 12 inches, while those of the Red Sea change only 30 inches from mean level,[2] rendering a connecting open channel practicable.

The project, as is well known, dates from the time of the Pharaohs. Between the Red Sea and one of the branches of the Nile Rameses II. constructed a canal which was wide enough to admit of the passage of two vessels abreast, the transit occupying four days. Allowed to fill up with the shifting sands of the desert, it was not until some twenty-four centuries later—namely in

[1] It is interesting to note that it was the example afforded by the courage and persistency of our countryman Waghorn, the creator of the overland route to India, that stimulated Lesseps to persevere with his undertaking.

[2] The maximum variation of the Atlantic tides at Colon is only $1\frac{7}{12}$ foot; that of the Pacific at Panama about 21 feet.

1859—that the present canal was undertaken by de Lesseps, in conjunction with Ismail Pasha, the Khedive of Egypt.[1] It was opened to traffic in 1869, the cost being about £17,000,000, of which only about £11,600,000 was spent in actual work of construction. The annual charge for administration, operation and maintenance is about £300,000. The average time of passage is twenty hours.

The net tonnage that passed through the canal in 1870 was 436,609 tons; in 1880, 3,057,421 tons; in 1885, 6,335,752 tons; in 1891 (an exceptional year), it reached a grand total of 9,200,000 tons. Taking the ten years, however, from 1882 to 1892, we find the net tonnage increased from 5,070,000 to 7,710,000 or 54 per cent. British shipping, in 1892, represented 76 per cent. of the total. The toll, in 1892, was about 8*s.* per net ton, and the profits after deducting all working expenses amounted to £1,400,000, equal to close on 8½ per cent. on the cost of construction.

The engineering problem involved was simple, being merely an "open cut" upon and between tide-levels. Its main feature was, however, unique—the danger and expense to be encountered on account of the tendency of the channel to choke with shifting sand. Constant dredging was, therefore, necessary, an item of cost which had not only been foreseen, but, as it turned out, exaggerated by many leading engineers. A commission of English engineers was formed to investigate and report upon the scheme, amongst them being Mr. R. Stephen-

[1] The concession was granted in November, 1854.

son, the late Mr. Rendel, Mr. MacLean, and Mr. Manby. Mr. Stephenson declined to act, stating that, after three visits to Egypt, the most lavish expenditure of capital would only produce a stagnant ditch between two tideless seas, unapproachable by large ships under any circumstances, and only capable of being used by small vessels in favourable winds. The report of the other engineers was equally unfavourable. It is satisfactory that at least one eminent English engineer, Sir John Hawkshaw, reported strongly in favour of the practicability of construction and maintenance.[1] Notwithstanding this endless work of dredging, the canal has been a perfect success, and fully established the soundness of de Lesseps' views, the acceptance of which by an unwilling and incredulous world cost him so much marvellous energy and unfailing courage. The heavy cost of maintenance is mainly due to the accumulated drift from the desert, and the constant operation necessary to combat this force of nature cannot be relaxed, otherwise

[1] The following were given by Sir John as the objections which had been raised to the work :

1. That the canal will become a stagnant ditch.

2. That the canal will silt up, or that the moving sands of the desert will fill it up.

3. That the bitter lakes through which the canal is to pass will be filled up with salt.

4. That the navigation of the Red Sea is dangerous and difficult.

5. That shipping will not approach Port Said, because of the difficulties that will be met with, and the danger of that port on a lee shore.

6. That it will be difficult, if not impracticable, to keep open the Mediterranean entrance to the canal.

the canal would, in the process of time, be obliterated in many portions.

The politicians were even more unfriendly.[1] In 1857, Palmerston said, "I can only express my surprise that M. F. de Lesseps should have reckoned so much on the credulity of English capitalists as to think that by his progress through the different commercial towns in this country, he should succeed in obtaining English money for the promotion of a scheme which is in every way so adverse and hostile to British interests;" and on another occasion he expressed himself thus: "I therefore think I am not much out of the way in stating this to be one of the bubble schemes which are often set on foot to induce English capitalists to embark their money upon enterprises, which, in the end, will only leave them poorer, whoever else they may make richer."

The unfortunate opposition of Lord Palmerston, it must be remembered, was to some extent justified by circumstances that have since ceased to exist. Grants of land given to a French company, governed by French laws, and directed from Paris, pointed to a permanent French territorial settlement in Egypt inconsistent with a real neutrality, and likely to lead to grave political difficulty.

The growing importance of the canal soon led the commercial community in England to see that Lord Palmerston had made an egregious blunder in declining to take any interest whatever in the project. It was left to

[1] Lesseps wrote: "During my first journey to England, while finding sympathy in the commercial and lettered classes, I had found heads of wood among the politicians."

men with wider views to secure for our country a share in the management of the canal, commensurate with the great interests we had at stake.

On November 25th, 1875, the English Government, on the initiative of Disraeli (acting, it is generally believed, on the suggestion of Mr. Frederick Greenwood, then editor of the "St. James's Gazette"), acquired by purchase 176,602 shares of the total number of 400,000, of the value of about £4,000,000, through which it became possessed of a preponderating control over the water-way.[1] These shares represent, at their present market value, namely, £90 per share, an investment of close on £16,000,000. The financial success of this enterprise has exceeded the most sanguine expectations

[1] Mr. Stead has told the story thus:—"It was Mr. Greenwood who saved the Suez Canal for England. He heard of it by the purest chance. He was dining at a club when Mr. Oppenheim told him that the Khedive was about to sell his shares in the canal to the French, or to the representatives of the French interests. Mr. Greenwood made inquiries, which satisfied him that Mr. Oppenheim was well informed. He at once went to Lord Derby, and informed him that unless he took prompt action the canal would practically become a piece of French territory. Lord Derby was astonished. Our representative at Cairo had left the Home Government entirely in the dark on the subject. Lord Derby, however, promised to telegraph and inquire. A few hours later, when Mr. Greenwood called again upon the Foreign Secretary, the news was confirmed. What was to be done? Mr. Greenwood did not hesitate a moment; the shares must be secured for England. Mr. Disraeli concurred. Lord Rothschild supplied the four millions, and the public were startled before the week was out by the announcement that the Khedive had parted with his shares to England, and that the English Government was now possessed of proprietary rights in the Suez Canal."

of Lesseps, the stock being now quoted in the market at more than four times its par value.

By a convention signed October 29th, 1887, the canal was exempted from blockade, and vessels of all nations, whether armed or not, are to be allowed to pass through it in time of peace or war.

By the opening of the Suez Canal, the most important in the world, and the most useful work ever created by man, the distance between Europe and the East is shortened by one-third. The canal was an engineering triumph, less on account of the physical difficulties overcome, which in contrast with other works of this class were not so very considerable, than for the immense impetus it gave to engineering enterprise generally.

It will thus be seen that there are physical conditions peculiar to the Suez Canal, as well as to the Panama project, already clearly shown, which render it impossible to draw sound comparisons between them and the Nicaragua Canal.

Conclusions.

It appears from a general consideration of the whole question that:

(1) Nicaragua is free from the obstacles met with in other localities; (*a*) high elevations in the Cordillera separating the two oceans, requiring tunnelling; or (*b*) a high summit level requiring a large number of locks for which an adequate water supply is not obtainable; or (*c*)

torrential streams whose control within reasonable limits is beyond the skill of the engineer.

(2) The route chosen is better than any other suggested within Nicaragua; it involves a smaller cost of construction, a shorter and generally a wider and more commodious line; it is safe as against the danger of destructive floods in a country of heavy rainfall (300 inches per annum).

(3) The plan of arresting the floods in large basins and spilling them over weirs of great length, or through many sluices of large capacity, solves admirably the whole flood problem. It is the least costly way of constructing a large portion of the canal, irrespective of the danger which might menace the works after completion.

(4) The advantages over Panama are these:—It is a fresh-water canal, with an admirable natural reservoir—the lake; it passes through a region offering prospects of great development, free from the marshy soil, the overpowering heat and the unhealthy climate of Panama; there is no Chagres river problem, and the "Divide" stands in a different category to that of the Culebra at Panama; there is a trade wind all the year, bringing with it health; there is the valuable experience gained at Panama; finally, there is accurate knowledge of what has to be done, based upon thorough and intelligent investigation.

(5) The problem of a ship-canal with locks, in a tropical country, where the feeding streams are subject to sudden and violent floods, first encountered on a great scale at Panama, has to be faced, though in a much lesser degree, and forms a new engineering problem.

(6) The inexhaustible water-power available is invaluable, while the material from the Divide cuts is useful for the dams, embankments, locks, and breakwaters.

(7) The works on the Atlantic side are by far the most difficult, less on account of their magnitude than by reason of the climate and rainfall.

(8) The only serious difficulties are (*a*) the Ochoa dam, (*b*) the Great Divide, (*c*) the Greytown Harbour; none of them, however, insurmountable.

(9) The engineering difficulties can be successfully dealt with by the proposed plans, with certain modifications already indicated, at a cost of about thirty millions sterling. A large margin for contingencies beyond the present estimate should be allowed. This view is emphasized by experience elsewhere, especially in the Suez and Manchester Canals, where the factors were more fully ascertained. The time allowed for completion, six years, is sufficient.

Chapter VI.

HISTORICAL SKETCH OF INTER-OCEANIC PROJECTS.

1501 to 1800.

FOR nearly four centuries, from the discovery of the New World to the present time, the history of Central America has been intimately associated with the question of inter-oceanic communication.

In the early years of the sixteenth century it was the search for the "Secret of the Strait," that drew the navigators of Europe westward. Rodrigo Bastidas, "Spain's best and noblest *conquistador*," was the first to see the shores of the great American isthmus, in 1501. He visited the Gulf of Urabá, and followed the coast westward to El Retrete or perhaps Nombre de Dios, in the Isthmus of Darien, whence he returned to Spain.

It was only on his fourth voyage (1502-1503), that the discovery of Nicaragua was made by Columbus, who had heard from the Indians on his previous voyages of a channel dividing Central America and uniting the oceans on either side,[1] thus providing the longed-for passage to

[1] The fourth voiage of Columbus. "In this same yeere, 1502, Christopher Columbus entered the fourth time into his discouerie with fower ship

those marvellous countries concerning which Marco Polo and others had told their tales, which would neutralize the damage to Spanish commerce caused by the discovery of the Cape of Good Hope route by Vasco di Gama in 1497-1501.

On May 9th, 1502, Columbus set sail from Cadiz with his brother, Don Bartolomé, and his son, Fernando. After considerable delay on the coast of Santo Domingo, caused by storms, the expedition discovered, on July 30th, the small island of Guanaja, situated some forty miles north from Truxillo, on the coast of Honduras. Columbus landed on the coast at a point now known as Cape Honduras; thence he sailed eastward against opposing winds and currents until September 12th, when he reached Cape Gracias á Dios. After doubling the Cape,—named so by him as a thanksgiving to God for more favourable winds—and discovering the Atlantic coast of Nicaragua, he skirted the coast to the Isthmus of Panama as far as Porto Bello, and possibly to the point named Nombre de Dios.[1] Within five years, then, of his discovery of the South American continent, the whole littoral from Cape Gracias á Dios, the north-easterly point of Nicaragua, to the Isthmus of Panama,

Gomara, historiae general, lib. 1., cap. 24.

at the commandement of Don Fernando, to seeke the streight, which, as they said, did diuide the land from the other side." Galvano, p. 100. Hakluyt edition.

[1] Gomara. "La istoria de las Indias," ed. 1552 (original), fo. xv.

"Queriẽdo buscar estrecho para passar de la otra parte de la Equinoçial, como lo auia dado a entender a los reyes, fuese derecho al poniente hasta dar en el cabo de Higueras. Siguio la costa meridional y corrio la hasta llegar al nombre de Dios. De dõde boluio a Cuba."

had been explored by the great navigator, in search of the channel by which he hoped the fabled riches of Zipangu and Cathay might be reached. Having discovered no trace of the "secret channel" he returned to Spain in 1504, and died a couple of years later, believing to the last that he had discovered the outlying coasts of the Indies.

Solis and Pinzon followed Columbus to Guanaja in 1506, thence sailing westerly along the coast of Honduras, with the object of discovering the strait, and two years later they were again sent by Spain to continue the search. This time they sailed southwards to La Plata.

In 1509, Alonzo de Ojeda was appointed Governor of Nueva Andalucía (the Colombia of to-day), to continue the search for the channel.

In 1510, a Spanish colony was established on the Caribbean coast, in the vicinity of Darien, and Vasco Nuñez de Balboa, who had sailed in 1501 under the orders of Bastidas, came from Hispañola. It was Nuñez de Balboa who first saw the Pacific, on September 25th, 1513, and assumed possession of it in the name of his sovereign, just eleven years after the discovery of Central America. At the time Governor of Santa Maria la Antigua, he started with a body of Indians and ninety Spaniards, on September 1st, under the pretext of searching for mines, making his way by sea to the province of Coiba, between Cape Tiburon and the Bay of Caledonia. Trustworthy natives being provided as boatmen and porters, on September 6th the expedition plunged into the unknown. After terrible privations, such as were

common to the *conquistadores*, they had the satisfaction of discovering from a summit the Gulf of San Miguel, on the Pacific Ocean, which Balboa called the South Sea, to distinguish it from the Atlantic, then known as the North Sea.

De Balboa was created by Charles V. the *adelantado*[1] of the countries skirting the newly-discovered ocean. He was one of the most remarkable men of a time abounding in great adventurers, and there is good reason to believe that, instead of Pizarro and Almagro, he would have been the conqueror of Peru, had it not been for his death (in 1517) at the hands of his rival, Pedrarias Davila.

All the early chroniclers bear testimony to the genius and daring of Balboa as a statesman and soldier. He was a born master of men, of indomitable will, and, for his time, humane. That he was a man of resource is proved by his transporting four brigantines across the Isthmus of Darien in 1516, an exploit of a wonderful character, imitated later by Cortes. It was a great achievement, and one that seems well-nigh incredible to anyone acquainted with the isthmus.

[1] The title of *adelantado* (from *adelante*, forward), conferred the greatest powers and all the legal attributes of jurisdiction to conquer, govern, and administer the territories discovered or to be discovered between or beyond limits specified in advance. These "capitulations," as they were called at the time, fixed the advantages reserved to the crown. The first expenses of the expeditions were supplied by the *conquistadores*, whose enormous interests gave them the most powerful incentive to succeed in these enterprises, no matter what the means employed.

The discovery of the South Sea inflamed the enthusiasm of the Spanish *conquistadores*. The wildest legends circulated concerning the fabulous riches of the countries to be found in the New World, and Spain went mad with excitement.

In 1517 Gil Gonzalez Davila arrived in Darien, with a special commission to carry out explorations on the west coast. Sailing from Panama, in 1522, he penetrated into the lake country, established that there was a sheet of fresh water, situated at a small distance from the South Sea, and having a communication with the North Sea (Atlantic). Of the lake he took possession, according to the prevailing custom, by riding his horse into it and drinking of the water. The origin of the name Nicaragua is said to be due to Davila, who, when making treaties with the natives, executed one with a chief named Nicarao, who ruled over the district in which is now situated the present town of Granada. He therefore called the lake Nicarao-agua (Nicarao's water), which, contracted to Nicaragua, has given a name to the whole country.

In 1519, Pedrarias Davila, sent from Spain in 1514, founded Old Panama, and continued the exploration of both coasts, assisted by Espinosa and Badajoz, also by Andagoya to the south of the Tuyra, and by Ponce and Hurtado in Costa Rica, who were the first to get definite information about the great interior lakes of Nicaragua, which, according to native report, communicated with the seas. The conquests of the next twenty years by Cortes in Mexico, Alvarado in Guatemala and Honduras, Pizarro and Almagro in Peru and Chili, and many others

of minor importance, led to greatly improved knowledge of Central America. In 1520 Magellan discovered the Strait bearing his name at the southern extremity of the continent; but, this being too far south, Charles V. ordered Cortes and Pedrarias to renew the search for the channel.[1]

In a letter to Cortes, in 1523, Charles V. ordered him to search carefully in the eastern and western shores of New Spain for the "secret of the strait," to which Cortes had frequently referred in his despatches, which should shorten by two-thirds the navigation from Cadiz to the Country of Spices, as the East Indies were then called. In the hope of solving the secret Cortes had already some three years before pressed Montezuma for information concerning the eastern coast of Mexico. A drawing of the coast was prepared, and, under Diego de Ordas, an exploration of the river Huascualco was made, with no favourable result, however. Disappointed in this quarter, Cortes wrote to the Spanish Court in 1524:

"I have determined to send three caravels and two brigantines in this quest, although I believe that it will cost me more than 10,000 pesos of gold, because if the strait is found I shall hold it to be the greatest service I have yet rendered." And again he wrote:[2] "I also propose to send out the ships I have had built on the South Sea, so that if it please our Lord, they may sail at the end of the month of July, in this year, 1524, on a voyage down the coast in quest of the said strait; since if

[1] Gomara. "La Conquista de Mexico," fo. xcvii.

[2] Lorenzana, p. 383.

it exists, it must be discovered by those on the South Sea, as well as the others on the North Sea, for the former will run along the coast until they either find the strait, or reach the land discovered by Magallanes ; and the latter will proceed, as I have stated, until they arrive at the Bacallaos.[1] Thus on the one side or the other, I shall not fail to solve the secret. I assure your Majesty that according to the information I have of the lands situated on the upper coasts of the South Sea, it would be of great service to myself, and likewise to your Majesty, to send these ships in that direction ; but being well aware of the great desire of your Majesty to know the secret of this strait, and of the great advantage the crown would derive from its discovery, I postpone all other schemes and interests, some of them of the highest moment, in order to pursue this object alone." [2]

Nicaragua became subject to the Spanish crown in 1524. A few years later, although the search for the secret channel was continued, the idea of an artificial communication to pierce the isthmus began to take shape, and search was made for some point, a low watershed between the two oceans, which could be cut through.

As early as 1529, Saavedra, interpreting the ideas of Balboa, according to Galvano formed a scheme for connecting the two oceans, and at the time of his death was on the point of laying his plans before the Emperor.[3]

[1] The entire coast of North America including Newfoundland.

[2] Lorenzana, pp. 384, 385.

[3] Commenting on this, the Jesuit José de Acosta says that such

From the year 1527 Pedrarias Davila (usually known as Pedrarias) then Governor of Nicaragua, commenced his subjugation of that country. His rule was marked by the most horrible cruelties, as narrated by Las Casas. The natives, numbering over 2,000,000 at the time of the Spanish discovery, are said to have been reduced to 200,000 by war, massacre, famine, pestilence, and by the cruel system of *repartimientos*.[1] Pedrarias, however, did something for the country he ruled, for he introduced sugar-cane, cattle, horses, pigs, goats, and fowls, into Nicaragua. By his order, Estete attempted to descend the stream from the great lake flowing to the Atlantic, which he called the Rio San Juan, but it was not till a year or two later that the great rapid was actually crossed by Machuca, whose name it bears to this day. This "Timur of the Indies," as Bancroft calls Pedrarias, died in 1530 at Leon, nearly ninety years of age.

At the point where the river leaves the lake a settlement was founded by Estete with a view to establishing a trans-isthmian route to compete with the one from Porto Bello to Panama, and, according to Herrera, a canal round the falls of the San Juan and another on the Pacific Slope were projected, and attracted a large share of attention in Spain as well as in Nicaragua, but at that period there was no need of a second route, and trade continued to follow the established highway.

an undertaking would run contrary to the Divine Will, and would be attended by some great catastrophe.

[1] The distribution of the natives as slaves amongst the conquerors, a custom dating from the time of Columbus.

The successor of Pedrarias was his son-in-law, Contreras, whose sons in 1548 made an unsuccessful attempt to throw off the Spanish yoke. Similar attempts, during the period of turbulence which ensued were renewed, and finally suppressed in 1568, when Nicaragua became one of the five provinces under the control of Guatemala (embracing Guatemala, Honduras, San Salvador, Nicaragua, and Costa Rica), an arrangement which continued till the final severance from Spain in the present century, in the year 1821.

In 1534 Charles V. ordered that the region between the Chagres river and the South Sea should be explored, with a view to obtaining the best and most convenient means of opening a communication. The Governor of Costa Firme, Andagoya, reported the scheme to be impracticable.

Gomara, the Spanish historian, in his "History of the Indies," indicated four routes—Nicaragua, Tehuantepec, and two in the Isthmus of Panama—where a trans-isthmian canal could be made. This far-seeing man wrote, in language which could not be improved to-day: "Mountains there are, but there are likewise hands. Take but the resolve and it can be made. If inclination be not wanting there will be no lack of means. The Indies, to which the passage is to be opened, will furnish them. To a king of Spain, when the object to be obtained is the spice trade and the wealth of the Indies, that which is possible becomes easy."[1]

[1] Gomara, fol. lix.

"Sierra son, pero manos hay. Dad me quiẽ lo quiera hazer que hazer

In 1567 Philip II. caused an exploration to be made by the engineer Batista Antonelli, who advised against the Nicaragua route, on account of the numerous difficulties encountered.

In the following century the troubles of the Spanish monarchy and its gradual decadence caused the question to be lost sight of, notwithstanding that the buccaneers, who then infested the Spanish Main,[1] made constant search for an easy route to the South Sea, frequently pillaging *en route* the towns of the interior, with the assistance of their native allies, the Caribs and Zambos of the Mosquito coast. Soon after the year 1570 the depredations of the buccaneers had diverted for the time the whole trade of Spain from the trans-isthmian to the Cape Horn route. In 1579 Drake made his way by the Straits of Magellan to the Pacific coast, which he ravaged so greatly that the Spanish trade had to be carried on from Granada as a centre, by way of Lake Nicaragua and the river San Juan, Nicaragua thus becoming for the first time the chief transit route between the two oceans.

The buccaneers made their headquarters at Pearl

se puede. No falta animo que no faltara dinero. Y las Indias donde se a de hazer lo dã. Para la cõtrataciõ de la especieria para la riqueza de las Indias y pa un rey d' Castilla poco es lo possible."

In his dedication to Charles V. Gomara says:—"The greatest event which has happened since the creation of the world (leaving aside the incarnation and death of Him who created it) is the discovery of the Indies."

[1] This was the name formerly given to the southern part of the Caribbean Sea with the adjoining coast, embracing the route taken by the Spanish treasure ships on their way to and from Spain.

Lagoon and Bluefields, and continued to harry Spanish trade by blockading the river San Juan and devastating the interior by means of daring raids. These lawless but adventurous spirits, acknowledging no authority, excepting, to a very limited degree, that of their leaders, were of British, Dutch, and French nationality, but chiefly the former.

In 1616, Diego Fernandez de Velasco, governor of Castilla del Oro, was directed to report on the feasibility of constructing a canal in the neighbourhood of Cartagena. An expedition was carried out, but no records exist to show what conclusions were arrived at.

Between 1648 and 1651 three additional sets of rapids, the result of earthquakes, made their appearance on the San Juan river, and the navigation then carried on by vessels of 80 to 120 tons trading between Granada and Nombre de Dios and Cadiz, was greatly impeded.

Immediately after the capture of Jamaica by the British in 1655, systematic efforts were made by the local government to control the transit trade through Nicaragua. Treaties were made with the Indian chiefs of the Atlantic coasts, and wood-cutting settlements between Cape Gracias á Dios and Boca del Toro were established, while the Bluefields buccaneers were protected and encouraged, presumably with a view to indirectly paving the way for a British protectorate. In 1671 Morgan sacked and burnt Panama. In 1665 a body of buccaneers under Edward David ascended the river San Juan in canoes, stormed Fort San Carlos, which guarded the entrance to the lake, and sacked and burned Leon. This expedition

revealed to Britain the value of the lake for inter-oceanic communication, and was the beginning of a series of attempts to seize and control it. Its leader is reported to have stated that "he valued the treasure captured in Granada no more than a barrel of wine in comparison to the knowledge he had obtained of the lakes and the country between the two oceans, and that he purposed returning to occupy the island of Ometepe (the volcanic island in Lake Nicaragua), to open the communication between the North and South Seas, and control it therefrom."

But the navigation of the river San Juan was very shortly afterwards rendered more dangerous by the Spaniards, who cast in rocks at the rapids, and erected towers at Castillo Viejo and the Toro Rapids, re-establishing also a military post at San Carlos. Another piratical expedition, which penetrated once more to Lake Nicaragua, was repulsed with some difficulty. This incursion is perhaps worthy of some notice, as it led to further ortification of the river San Juan under the superintendence of an engineer Fernando de Escobedo, who, it is said, with the object of diverting some of the waters of the main channel, and thus rendering its navigation more difficult, was foolish enough to open the mouth of the Brazo Colorado (the southern branch of the San Juan). This act has, in the course of two centuries, brought about the destruction of what was then a good natural harbour at San Juan del Norte (Greytown), and the mischief wrought will have to be undone at great cost, now that the canal is to be made. Though the buccaneers

dared no longer ascend the river, they still continued to blockade its mouths. Inter-oceanic transit was once more practically stopped, and a successful piratical raid under L'Olonnais, who marched on Granada from the Gulf of Fonseca, and sacked and burned it, in 1685, gave Spanish commerce along this route its *coup de grâce.* The invading buccaneers left Central Nicaragua three years later. This expedition was followed by one under Dampier (1689-90) against Leon, which, ascending the Estero Real, was only partially successful.

In 1698-1700 came the episode of Paterson's Scots settlement at Darien. The Jamaica Government no longer protected the buccaneers, but established permanent settlements along the Atlantic coast, attached the natives to its interests by promises of milder treatment, and by the abolition of forced labour. Finally, during the first half of last century, they completely and efficiently blockaded the whole coast.

Shortly before 1695, William Paterson, one of the greatest men Scotland ever produced, conceived the idea of obtaining for Great Britain, to quote his own language, "the keys of the universe . . . enabling their possessors to give laws to both oceans, and to become the arbiters of the commercial world."[1] He proposed to carry out his scheme by means of an *entrepôt*, or settlement, at the Isthmus of Darien, as a distributing centre for the commerce of the world.

He obtained the incorporation by the Scottish Parlia-

[1] "Central America in 1701," by Wm. Paterson. S. Bannister, 1857, p. 61.

ment of "the Company of Scotland trading to Africa and the Indies." Money was freely subscribed in Scotland, England, and Holland, and the prospect, so far as financial means went, was encouraging until the English and Dutch East India Companies, fearing injury to their monopolies, strongly opposed the project. Support from England and Holland was then withdrawn, and Scotland alone was left to carry on the work, which she, however, did with enthusiasm.

The Scots settlement at Darien was organized, and 1,200 pioneers, sailed from Leith on the 26th July, 1698, reaching their destination on the 4th November. Unfortunately for the success of his scheme, Paterson planted his colony in the Bay of Caledonia, in a terribly unhealthy situation, where he founded Puerto Escoces. But, even if the climate had been perfect, the opposition of England and Holland alone was enough to prove fatal to his success. Their colonies in the West Indies were forbidden to sell the pioneers food or supplies. Unsupported from home, Paterson had to contend against innumerable local difficulties. The Indians, finding they were simply changing masters, devastated the country around the Scots; the privations endured aided the epidemic which ravaged the settlement; the hostility of the natives grew; and at last came anarchy among the settlers, who had been reinforced by another expedition numbering some twelve hundred. While matters stood thus, Herrera, at the head of a Spanish squadron and a large force, appeared in 1700 and laid siege to the remainder of the colony, who had managed to escape the series of calami-

ties by which they had been overtaken. The garrison capitulated with honours of war, and took leave of Darien on the 11th April, 1700, carrying with them such arms and stores as remained. It is said that not more than twenty ever returned. The expedition was definitely abandoned, but not before Paterson, from his settlement in Caledonia Bay, had made several journeys into the interior to ascertain the possibility of inter-oceanic communication, and indicated a line which a canal might follow.

Paterson, who, amongst other things, was the founder of the Bank of England, was a man of the greatest and most ambitious views, one of the most clear-sighted spirits of his time, a master-mind in the domains of politics, commerce, and adventure. Like other great men who have propounded new ideas, he was the object of the most bitter contempt and abuse through a series of years, and he was nearly brought to ruin by his project.

Had it not been for the disturbed relations between Scotland and England before the Union, and the want of accord between William III. and his ministers, Paterson would have been supported from home, might have removed his colony to some healthier site, and, overcoming all difficulties by the force of his genius, have given to this country a colony more important than all her present territories in America.

With a colony established there the possession of the whole American isthmus would have been assured to Britain, and doubtless, long ere this, a passage would have been opened from sea to sea. It was a great gift

offered by Paterson to his country, one fraught with possibilities of the greatest consequence, by which the destinies of the world might have been greatly changed.[1]

A passage from one of Paterson's many writings must be given:

"Besides, and above all, as being an isthmus, and seated between the two vast oceans of the universe, furnished on each side with excellent harbours, between the principal whereof lies the more easy and convenient passes between the one and the other sea. . . . Those ports, so settled, with passes open, through them will flow at least two-thirds of what both Indies yield to Christendom, the sum whereof in gold, silver, copper, spices, salt-petre, pearls, emeralds, stones of value, and such like, will hardly amount to less than thirty millions of pounds sterling yearly. The time and expense of the voyage to China, Japan, and the richest part of the East Indies, will be lessened more than a half, and the consumption of European commodities soon be more than doubled, and afterwards yearly increased."[2]

When at Colon, I made personal inquiries regarding Puerto Escoces, in continuation of written inquiries made by me before my visit to Central America.

All I could learn was little. From the nature of the Paterson venture, the Spaniards had not preserved any records, and the Colombians of the present day do not feel any great interest in the history of the country,

[1] Wyse says of this: "Jamais une nation n'a repoussé un don aussi précieux."

[2] "Central America in 1701," p. 60.

beyond their own efforts for independence. The only people likely to know anything about the place are descendants of English people in Colombia who were sympathisers with the colonists in the War of Independence.

Puerto Escoces is about 150 miles from Colon, on one of the most unfrequented parts of the coast on the east side of the Gulf of Darien, and, as may be seen from a map, not on the route between Colon and Cartagena, nor in the way of any small craft bound from Cartagena to the Atrato river. Coasting schooners or sloops occasionally trade between Colon or Cartagena, and the San Blas coast, *i.e.*, between Colon and the Gulf of Darien, for cocoanuts, etc.; but the Gulf itself seems out of their way. The Indians of San Blas are an uncivilized race, not recognizing the Colombian Government, except under compulsion.

At Portobello there lives an old native named Ildefonso Rodriguez, who may perhaps know something about the place, as he trades among the San Blas and other Indians. About forty years ago a Frenchman, whose name I could not ascertain, who had settled for some time near Port Caledonia by himself, induced some people from Cartagena to go with him on an expedition in the neighbourhood of Puerto Escoces. Three of the Cartagena people were said to have been killed by monkeys, but none of their relations now living can give any information. A Mr. Fabian Gogoso of New York was one of the party.

The "West Indian Pilot" of 1893 says that "traces of

the settlement are still to be seen." This book, however, was originally compiled in 1829, and it is probable that the original remarks have been retained, as the place is so far out of the way.

In the latter half of the eighteenth century surveys were executed by Don Augustin Cramer and Don Miguel del Corral in Tehuantepec, and by Yzasi and Alexandre in Nicaragua, but no result followed.

In 1780 Nelson made his expedition to seize Castillo Viejo with a view to securing command of the lakes and the communications between the two oceans, but sickness broke out among his men, and, the rains setting in, the expedition had to be abandoned. Nelson himself broke down, and the subsequent ill-health from which he suffered dates from this period.

In the following year a survey was made for the Spanish Government by Manuel Galisteo in Nicaragua, who reported that it was impossible to make a canal between the lake and the Pacific, and in 1791 Martin de la Bastide published a memoir on the passage between the North and the South Seas through Nicaragua.

Chapter VII.

HISTORICAL SKETCH OF INTER-OCEANIC PROJECTS.

1800 to 1884.

A POWERFUL impetus was given to the whole question of inter-oceanic communication by the travels and writings of the great Humboldt, especially his account of the comparative merits of the various routes across the Isthmus. Five years were spent by him, 1799-1804, in explorations and scientific investigations throughout the Spanish-American States and the Isthmus, from Peru to Mexico. In his "Personal Narrative of Travels;"[1] he discusses the practicability of opening direct communication between the Atlantic and Pacific Oceans, a subject which he had treated in the first volume of the "Political Essay on New Spain."

He proposed five schemes for uniting the two oceans and pointed out the great advantage possessed by Nicaragua in having an abundant water supply to fill the canal.

"Such is the happy position of these five points," he

[1] Vol. vi., pp. 239-298.

wrote, "that they are placed at the centre of the New Continent, at an equal distance from Cape Horn and the north-west coast. Opposed to each (in the same parallel), are the seas of China and India, an important circumstance in latitudes where the trade-winds prevail; all are easily entered by vessels coming from Europe and the United States." [1]

Elsewhere, in discussing the far-reaching effects of an inter-oceanic passage through the Isthmus, he says:— "Then only can any great changes be effected in the political state of *Eastern Asia*, for this neck of land, the barrier against the waves of the Atlantic Ocean, has been for many ages the bulwark of the independence of *China* and *Japan*." [2]

Finally, he pronounced such an undertaking to be one "calculated to immortalize a government occupied with the true interests of humanity." [3]

The most brilliant prophecy ever made concerning the Nicaragua Canal was that of Goethe in 1827. In the "Conversations of Goethe with Eckermann and Soret," [4] occurs the following passage:

"February 21, 1827. Dined with Goethe. He spoke much, and with admiration, of Alexander von Humboldt, whose work on Cuba and Columbia he had begun to read, and whose views as to the project for making a passage through the Isthmus of Panama appeared to

[1] "Personal Narrative of Travels," vol. vi., p. 242.
[2] "Political Essay on New Spain," vol. i., p. 43.
[3] *Ib.*, p. 43.
[4] Pages 222, 223. Oxenford's translation, ed. 1883.

have a particular interest for him. 'Humboldt,' said Goethe, 'has, with a great knowledge of his subject, given other points where, by making use of some streams which flow into the Gulf of Mexico, the end may be perhaps better attained than at Panama. All this is reserved for the future and for an enterprising spirit. So much, however, is certain, that if they succeed in cutting such a canal that ships of any burden and size can be navigated through it from the Mexican Gulf to the Pacific Ocean, innumerable benefits would result to the whole human race, civilized and uncivilized. But I should wonder if the United States were to let an opportunity escape of getting such a work into their own hands. It may be foreseen that this young State, with its decided predilection to the West, will, in thirty or forty years, have occupied and peopled the large tract of land beyond the Rocky Mountains. It may, furthermore, be foreseen that along the whole coast of the Pacific Ocean, where nature has already formed the most capacious and secure harbours, important commercial towns will gradually arise, for the furtherance of a great intercourse between China and the East Indies, and the United States. In such a case, it would not only be desirable, but almost necessary, that a more rapid communication should be maintained between the eastern and western shores of North America, both by merchant ships and men-of-war, than has hitherto been possible with the tedious, disagreeable, and expensive voyage round Cape Horn. I therefore repeat, that it is absolutely indispensable for the United States to effect a

passage from the Mexican Gulf to the Pacific Ocean; and I am certain that they will do it.

"'Would that I might live to see it!—but I shall not. I should like to see another thing,—a junction of the Danube and the Rhine. But this undertaking is so gigantic that I have doubts of its completion, particularly when I consider our German resources. And, thirdly, and lastly, I should wish to see England in possession of a canal through the Isthmus of Suez. Would I could live to see these three great works! It would be well worth the trouble to last some fifty years more for the very purpose.'"

In 1814, the Spanish Cortes, realizing too late the importance of the question, decreed that the canal should be built, but the liberation of the Spanish Colonies put an end to the proposal, though Spain continued to hold the Atlantic coast for some years longer, and even undertook the fortification of San Juan del Norte.

In 1825 the Congress of the United States of Central America decreed the cutting of an inter-oceanic canal through Nicaragua, and called for proposals, a concession being given to a Mr. Beniski.

In 1826, Mr. Clay, U.S. Secretary of State, ordered an examination of the route.

The Congress of Panama took place in 1825, at which the canal question was discussed, and General Werweer, the representative of Belgium, was so impressed with the idea of a Nicaragua Canal that on his return he endeavoured to establish a company to carry it out. Between

1825 and 1829, several United States schemes were proposed but came to nothing. In 1829, General Werweer returned to Nicaragua to treat for a canal concession in the name of King William of Holland. A franchise was decreed, and the scheme seemed then to be in a fair way to a commencement, but the revolution of 1830, which separated Belgium from Holland, put an end to the undertaking.

In 1825 Bolivar, President of Colombia, granted a concession to Baron Thierry for the creation of a canal at Panama. Finding that Thierry had neither the technical knowledge nor the financial resources to carry out such a work, Bolivar himself started the surveys with two officers, Lloyd and Falcmar. Lloyd's report, published by the Royal Society of London in 1830, showed a difference of more than three feet between the mean level of the two oceans, an error that was long reproduced and exaggerated. Lloyd's route was practically that adopted for the Panama railway.

In 1835 the United States Senate passed a resolution in favour of building the Nicaragua Canal, and Mr. Biddle was deputed by President Jackson to examine the routes and negotiate for a concession, but he returned without having carried out the inspection.

In 1837, Morazan, the President of the Central American Confederation, appointed two engineers, Bailey and Bates, to survey the canal, and, as a preliminary, sent a force to expel the occupants of San Juan del Norte, which during the next twelve years was taken and re-taken by the Nicaraguan Government and by the

Mosquitos. The survey was brought to a close by the dissolution of the Government.

In 1838, Captain Edward Belcher ascended the Estero Real for thirty miles, and suggested the possibility of water communication between Lake Managua and the Gulf of Fonseca. A year later, J. L. Stephens carried out a confidential mission to Central America on behalf of the United States Government. In 1843 a lock canal was recommended by Garella and Courtines, who studied the Isthmus for the French Government.[1]

The disturbances due to the dissolution of the Republic of Central America precluded any progress from 1837 till 1844, when Don Francisco Castellon of Nicaragua visited France, and endeavoured to induce Louis Philippe to establish a protectorate over his country, and to take up the question of an inter-oceanic canal. The king had, however, just sent the engineer Garella to report on the Panama route, and other interests intervened. The interest and co-operation of Louis Napoleon Buonaparte, then a prisoner at Ham, was solicited. The Prince studied the subject, was deeply impressed, and early in 1846 received from the Nicaraguan Government the power to organize a company in Europe to carry out the work, under the title of the "Canale Napoleone de Nicaragua." In that year he escaped to London, and published a pamphlet entitled "The Canal of Nicaragua, or a Project for the Junction of the Atlantic and Pacific Oceans by means of a Canal," demonstrating the immense advantages

[1] The route proposed was from the Bay of Limon to the Bay of Vaca de Monte. See "Canal de Panama," Garella.

of the scheme.[1] The project was quite lost sight of in the events which in December, 1848, made Louis Napoleon President of the French Republic. The "dreamer of Ham" showed in his pamphlet that he held very decided views as to the enterprise, and that, like the great Napoleon, he took a deep interest in questions of international communication.

The British Government in 1847 advanced claims to the control of the proposed inter-oceanic water-way, one terminal having been more or less in the hands of the protected Mosquito Indians since 1824. An expedition under Captain Lock was despatched by Sir Charles Grey, Governor of Jamaica, to occupy San Juan del Norte, the river, and the forts, while the Pacific squadron seized the Isla del Tigre, in the Gulf of Fonseca, and the Mosquito Indians invaded Chontales and Nueva Segovia. In January 1848 Captain Lock seized Granada, and did not retire till the Nicaraguan Government signed the "Treaty of the Hundred Islands," by which it undertook no longer to molest the Mosquito territory, or

[1] The route proposed was from San Juan to Realejo, a distance of 278 miles, *viâ* Lakes Nicaragua and Managua. The Tipitapa river was to be canalised and have three locks, and there were to be seven or eight locks on the San Juan. The total cost was estimated at £4,000,000, and a traffic of 900,000 tons was counted upon. Señor De Marcoleta, *chargé d'affaires* of Nicaragua in Belgium and Holland, went to Ham to sign treaty with Prince Napoleon, conferring upon him full power to carry into effect the object in view. The Prince informed the French Government of the proposition from Central America, and pledged himself that if allowed to reside for a few months in Tuscany, he would afterwards proceed directly to America for the purpose specified. The request not acceded to.

interfere with the occupation of San Juan del Norte, renamed Greytown, in honour of Governor Grey. But the Nicaraguan Government, acting with the approval and support of the United States, who were anxious to improve their communications with the Pacific coast, had meanwhile signed a contract with a firm for making a canal. This concession lapsed, but in 1849 a contract was signed with Mr. Cornelius Vanderbilt and his associates, for a regular transportation service across Nicaragua from ocean to ocean. The extraordinary Selva-Hise Convention, which was quite unauthorized by the United States, between the United States and Nicaragua, was agreed upon January 21st, 1849, but never submitted to Congress, Mr. Hise being recalled. The concession to the United States, an insurrection in the Bay Islands, and lastly, the renewed Nicaraguan attempts against the Mosquito reserve, led to another occupation by the British of the Isla del Tigre, and to an imminent rupture of diplomatic relations between Great Britain and the United States of America. The question was, however, finally arranged by a convention known as the "Clayton-Bulwer Treaty," concluded between Great Britain and the United States on April 19th, 1850,[1] by which the neutrality of all and any present or prospective inter-oceanic water-ways across Nicaragua was absolutely guaranteed.

Vanderbilt had in the meantime established his transit service with steamers on the river and lake, and coaches running at first from Granada to Corinto, and finally over

[1] See Appendix, No. I.

a fine macadamized road from La Virgen to San Juan del Sur. The traffic with the newly-discovered goldfields of California made this monopoly enormously valuable until the Panama Railroad supplied a better means of transport. The construction of a canal was also contemplated, and Prince Napoleon's scheme having been abandoned on account of the silting up of Realejo Harbour, United States Minister Livingstone proposed in 1849 an alternative scheme. In 1847 a rival and impossible project was put forward by the Republic of Costa Rica, anxious to share in the advantages of an inter-oceanic canal, and a survey was made, in 1847-48, by the Danish engineer Œrstedt.

In 1851 Vanderbilt, acting on a concession obtained by Squier in 1849, formed the American Atlantic and Pacific Canal Company, and intrusted the survey of the scheme, from Brito *viâ* the Lake of Nicaragua to San Juan del Norte, to Colonel O. Childs, United States Army, who laid the foundation of all the later surveys, which have fully confirmed the accuracy of his work. His canal was to be 194 miles in length, with locks. It was on this survey that Childs discovered the lowest pass in the Cordillera.

In 1852, Mr. Stephen Bailey renewed the proposal for a canal from San Juan del Sur to La Virgen, avoiding the valley of the Lajas, and following the transit route, and Squier published his work on Nicaragua, in which he revived Captain Belcher's project, with the Pacific terminus at Fonseca Bay.

In 1853, Captain Bedford Pim proposed a railway

from Punta Mico (Caribbean Sea) to San Miguelito on Lake Nicaragua, the profits of which were to be devoted to extending the railway across Nicaragua to the Pacific coast.

Local troubles and the wars of the Filibusters under Walker from 1855 to 1860 put a stop to everything except the American transit. But in 1858 a well-known Frenchman, Félix Belly, a talented writer, though without the requisite engineering knowledge, backed by the Government of Costa Rica, revived the projects of Œrstedt and Childs, and a convention was signed in May 1858 with the Governments of Costa Rica and Nicaragua to carry this out. Belly, however, failed to procure the necessary financial support.

On January 28th, 1860, Great Britain, by the Convention of Managua, and in pursuance of the policy initiated by the Clayton-Bulwer treaty, handed over her suzerainty of the Mosquito reserve, including San Juan del Norte, to Nicaragua.

Within six years time from 1860, three schemes for inter-oceanic communication were proposed; the first by Mr. Loos for a ship railway across Nicaragua; the second by Thomé de Gamond, to turn the San Juan into a canal by flooding the side valleys below Lake Nicaragua, and the third by Mr. Samuel, to make special shallow canals and transport vessels through them on rafts.

In 1866-67 Rear-Admiral C. H. Davis, U.S.N., reported to his Government on Childs' scheme, and gave an opinion against a Nicaragua canal on account of its great length, the probable excessive cost, the bad harbour

accommodation at Brito, and the superior merits of other canal schemes.

In 1868 the Nicaraguan Government gave up Belly's scheme as hopeless, and entered into a contract with the well-known financier, capitalist, and engineer, Michel Chevalier, but even his exceptional *prestige* in France was insufficient to secure the desired support and the Franco-Prussian War in 1870 finally ended the attempt.

In 1869 the American transit across Nicaragua came to an end, killed by the opening of the Panama Railway, and the company sold their concession for the navigation of the river and lake to an Italian company, who held it for twenty years, and then sold it to a company connected with the present American Canal Company.

In 1869 a convention between the United States and the United States of Colombia, providing for the construction of a ship canal between the Atlantic and Pacific Oceans through the Isthmus, under which the United States was to have the exclusive control, was transmitted by President Andrew Johnson to the Senate, but failed of ratification. A year later another treaty was transmitted to the Senate by President Grant, but also failed.

In 1872 an expedition was sent by the United States Government under Commander Crossman (who was drowned crossing the San Juan river bar) and Captain Hatfield, which reported on various schemes. In 1872-73 the route was surveyed and reported on by Commander E. P. Lull, aided by Mr. A. G. Menocal. These surveys were merely a portion of the general scheme for

the exploration of all the various routes by the United States Government.

In 1877, the Nicaragua Canal Concession was canvassed by a representative of Lesseps, who had turned his attention to this route; but the party in favour of the United States was too strong in the Nicaraguan Congress.

The President of the United States appointed Admiral Ammen and Mr. A. G. Menocal delegates on behalf of the United States Government to attend the International Congress held at Paris, May 15th, 1879. This Congress was convened ostensibly to determine the relative merits of the different canal schemes, but, in fact, to select and approve the route of Panama, for which Lieut. Napoleon Bonaparte-Wyse had the previous year obtained a concession from the Colombian Government. Admiral Ammen and Mr. Menocal were present at the sittings of the Congress, and presented the advantages of the Nicaraguan route. Action was, however, limited by the adoption of a resolution that the construction of a canal at a uniform level was possible, and that "the maritime canal which would above all offer such advantages, should be located between the Gulf of Limon and the Bay of Panama."

Mr. Blaine, as Secretary of State, and his successor, Mr. Frelinghuysen, prepared the way for a more definite interest on the part of the United States in a Nicaragua canal. Mr. Frelinghuysen's treaty was concluded and submitted to the Senate in December, 1884. Great secrecy as to its provisions was maintained, but a copy of

President Arthur's message, with which the treaty was transmitted, as well as of the treaty itself, were published in the "New York Tribune" of December 18th, 1884.[1] In the following year the treaty was withdrawn for further consideration, and was not again presented before Congress.

[1] See Appendix, No. III.

Chapter VIII.

SOCIAL AND POLITICAL NICARAGUA.

IN treating of the social and political aspect of Nicaragua, I have come to the conclusion that a *pincelazo á brocha gorda*, as the Spaniards have it, a brief general consideration, of Nicaraguan life and characteristics,—those curious little ways, especially, that so frequently attract the attention, and amuse, and not unseldom try the patience of, the European traveller—is preferable to a mere formal detailing of one's journeyings from day to day, embodying a categorical account of individual towns, villages, ports, and plantations, with the respective information thereto appertaining.

As might be expected, very little of the comfort of modern travel is to be experienced in Nicaragua. The existing railroad system consists of only two separate divisions, neither of them extensive. The first, fifty-six miles in length, commencing at the port of Corinto on the Pacific coast, terminates at Momotombo on the north-western shore of Lake Managua, thus affording a connection with the lake steamers, while the second section connects Managua with Granada, a distance of thirty-two miles.

Both the railroad and the steamboat lines on Lake Managua are owned and administered by the Government, who defrayed the cost out of the public funds, most of the money being raised, so it is said, "by dint of wholesale economies made in the various branches of the public service." The steamer service on Lake Nicaragua, like that on the San Juan river, belongs to, and is managed by Mr. Pellas, an Italian resident of Greytown. There are three classes of railway passenger coaches, with a graduated baggage allowance, all excess being charged as first-class freight. At any rate, so read the regulations, which, judging from personal experience, I should say were certainly more honoured in the breach than in the observance, seeing that the average Nicaraguan traveller invariably enters a train with several bags and parcels, generally a bundle of bedding and a caged bird, a gourd or two for the making of *tiste*, and frequently a *pot de chambre*, all of which are strewn around in the most reckless manner, regardless of the fellow-travellers' comfort. In the United States, people, it is known, travel with a minimum of baggage; here they carry most of the household effects. The first-class cars are supposed to have the luxury of a separate smoking compartment, but in all classes smoking is allowed, men and women alike indulging in the cigar or cigarette. Newsboys, selling generally Spanish translations of French authors—Xavier de Montépin, Ohnet, Guy de Maupassant —or local papers, "El Diarito," "El 93," etc., and the *confitero* flit to and fro. Nicaraguan trains go very leisurely, and the local joke among the foreign residents

is that even the locomotives seem to be affected by that enervating feeling due to a tropical climate. The river steamer service is very indifferent, even after all due allowance is made for the difficulties to be overcome. Although forearmed, apart from a first-class ticket giving me the right to a berth, with a general letter of introduction to the pursers entitling me, as one might reasonably imagine, to at least a little extra consideration at their hands, I found myself quite left behind in the struggle for accommodation, all the berths being monopolized by doubtless more or less worthy, but not too cleanly, Indian traders and market-women, who on taking possession proceeded to scatter in their cabins and surrounding the entrances a chaotic mixture of wares, wardrobes, and travelling *impedimenta*. Wretched, in fact one may almost say uneatable, food is supplied, but I noticed that the local experienced traveller wisely strengthens his soup with a little Liebig, and carries his own coffee and chocolate, bringing to mind the Mexican proverb, "Mas vale saber el camino que ser buen vaquero." "It is better to know the road than be a good cowboy." The washing accommodation is almost nil. The unprepared grumble and complain, but so far no improvement has been vouchsafed them.

A few minutes before arriving at one's destination on the lake steamers, the passengers are busily engaged in removing the traces of a more or less fatiguing journey, smart skirts and shawls, clean shirts and high collars, being donned in frantic haste, the local dandy even going so far as to produce a new silk hat to celebrate the occasion.

What most impresses the stranger is the air of *dolce far niente*, that traditional indolence deemed not only natural but the right thing, so characteristic of the Spanish-American, which seems to pervade everybody and everything, a total absence of life's bustle and hurry everywhere, even in the capital and principal cities, where at least one might expect some little activity. Business is always postponed, if possible--*mañana*, *mañana*, to-morrow, to-morrow, as they say—and here you have the key to their character, the procrastination that so sadly handicaps them in the race of progress. Life in the cities is but a slight improvement on the unspeakable dulness that hovers over country existence. Even in the busiest centres of the metropolis, in the hotels, commercial quarters and clubs, are to be noted a general listlessness and sleepiness. But at the same time it must be confessed that these places are far from inspiriting.

Even the best Nicaraguan hotel makes but a poor show, being meagrely furnished, never over-clean, wretchedly managed, and comparatively dear. There is a strong prejudice against bathing and even washing while on a journey, and for some days afterwards. It is the *costumbre del pais*. The dust is not washed off the face for several days after arrival, especially if the traveller has come from the *tierras calientes* (hot country, or lower region), for a too sudden opening of the pores of the skin will certainly produce fever, according to the popular belief.

The people of Nicaragua, according to Squier,[1] "are generally scrupulously clean in their persons, except when

[1] Vol. i., p. 271.

travelling or ill, and then the touch of water is prohibited. But beyond the grand *sala*, and the apartments appropriated to visitors, their houses are frequently very far from being patterns of neatness. I have seen sleeping apartments, occupied by families of the first respectability, which certainly had not been swept for weeks, not to say months. Yet the beds in these rooms were clean and neat; the more so, perhaps, from the contrast. These remarks are less applicable to Granada than Leon, for in the former city the example of the foreign residents has worked a partial reformation amongst the native housekeepers."



THE AQUADOR.

In many hotels the bath so devoutly wished for by the arriving traveller is unobtainable, while the amount of vital energy necessary, coupled of course with a *douceur*, in order to procure a little hot water, is extraordinary. Report had spoken of the existence of a bath in the chief hotel of Granada, and thither I directed my steps on

arrival. Securing the key from the barman, I made my way past a dirty kitchen and a still dirtier backyard, to a little dilapidated outhouse that bore the mystic symbol *El Baño*. Opening the door, with some little misgivings, I found a muddy floor, with a rickety bench on which to lay my clothes, a slimy strip of wooden grating on which to take my stand, a bricked-up recess containing several pints of not too clean-looking water, and half a cocoanut shell with which to perform my ablutions. Only this and nothing more, and yet they charge thirty cents for this questionable luxury. Hotel charges naturally vary, generally from $1 to $2.50 (native money) a day, the latter rate prevailing in the principal cities. With regard to the food, perhaps the less said the better, not so much that good meat, fish, fowl, and vegetables are not obtainable, but rather that all is spoiled by indifferent cooking. The Spanish *cuisine*, with its exasperating reiteration of oil and garlic, garlic and oil, is bad enough, but still preferable to Nicaraguan hotel cooking, with its sloppy soups, greasy stews, and tough pieces of baked meat flanked with half a roasted plantain and badly boiled rice.

Tortillas (cakes made of maize)[1] and *frijoles* (beans)

[1] "Fresh and unblemished maize on the ear is always selected," says Squier. "It is shelled, soaked in alkali to remove the hull, and then carefully and repeatedly washed in cold water. It is afterwards placed on a *metatl*, or grinding stone, and reduced to the extremest fineness. A very little cheese is ground with it, to give it consistency. A roll is then taken in the hands, beaten into a flat cake, and placed on an earthern pan, already heated upon the fire. When sufficiently done upon one side, it is adroitly turned on the other, and is finally served hot and crisp at the table."

are the standard dishes, the former being good, when well prepared. Chocolate[1] and coffee, admirable in themselves, but only tolerable as prepared, are the principal beverages; *tiste* (parched corn, ground with chocolate and sugar and mixed with water), is good; but as a rule do



THE WATER VENDER.

not ask for a cup of tea, usually only to be bought at a drug store, and regarded by the Nicaraguans as a medicine, which, in the way it is usually served, it certainly is. Every hotel has its accompanying bar, stocked with bad

[1] The derivation of chocolate, suggested by Gage, who travelled in Nicaragua about 1590, is that the term is Indian, compounded from *atl*, which in the Mexican language means water, and *choco-choco-choco*, the sound which water makes when stirred in a cup.

liquors, to be procured at high prices, and I may mention that the proprietors have an exasperating proficiency in running up one's wine bill, and exhibit an audacity beyond anything in my experience elsewhere. Nearly every inn-keeper has a black list of defaulters who have failed to pay for liquors ordered, to which is affixed a footnote saying that if the aforesaid do not pay within fifteen days, their names will be published, and published they duly are in the advertisement columns of the local paper, with a notice that publication will not cease until the bills are paid, a proceeding which occasionally elicits a spirited *démenti* in the issue of the following day.

A word with regard to the sleeping accommodation of Nicaraguan hotels. Misfortune notoriously makes man acquainted with strange bedfellows, and it may safely be said that the Nicaraguan hotel-keeper does his best to aid misfortune; for to crowd as many beds and bedfellows as possible into a bedroom seems the height of his ambition. On one occasion I myself had the questionable honour of passing the night in a not too large dormitory with six others, and a rather mixed company; while a friend of mine related to me an instance of having had to share a small bed with a large parish priest, the two remaining couches that the room contained being respectively tenanted by a notorious gambler and two *demi-mondaines*. As a rule there may not be more fleas in a Nicaraguan hotel bed than are at times to be found in those of other tropical countries, but occasionally their numbers and voracity are exceedingly trying to the weary traveller, whose only resource is to resign himself

to the inevitable, and think of that expressive Spanish-American saying, "Paciencia, pulgas, que la noche es larga!" "Patience, fleas, for the night is long!"

As I have already said, Nicaraguan clubs cannot be held to possess any great attraction for local masculine society. The average club consists, as a rule, of a couple of long rooms, tenanted by two or three card-tables, rows of rocking-chairs, an indifferent piano and a worse billiard-table, a bar, and frequently a flat roof, used in the cool of the evening as a smoking lounge, completing the establishment. With regard to club life, I would merely remark that here indeed you will find the veritable embodiment of the sameness, *insouciance*, and indifference invariably displayed by the Spanish-American.

And now a few remarks on other phases of Nicaraguan life and customs. Enter the narrow street, gaze around on massive wall and tiled roof, lofty portal and grating of rusty iron, with the hush of old-time stillness over all. Pass out along the narrow pathway of sun-scorched pavement, by the open-doored shops and stores, denoted always by some specific name, high-sounding and pretentious,—such as "The Pearl," "Precious Things," "The Emerald," "Elegance,"—and take a glimpse at the interior of the private houses with their paneless, iron-barred windows, so suggestive of either the convent or the jail. Stout wooden shutters inside, generally closed from nine o'clock in the morning until the afternoon, keep out the heat and dust, the latter for two-thirds of the year being a source of great annoyance. Through the open windows the same picture of family life presents

itself as it has done for ages past, as it will do for years to come. A bare room with little attempt at adornment, and less sign of comfort; two rows of rocking-chairs fronting one another, tenanted by the listless inmates, the male sex ranged on one side, the ladies on the other, this rule of the division of the sexes being strictly observed. The sole exception, somewhat rarely made, is in the case of the accepted suitor, who has the privilege of occupying a chair at the side of his sweetheart.

The idleness of the ladies, who are sadly uneducated and ill-informed, is something stupendous, the only work patronized being some piece of trivial embroidery,—a marked contrast, be it noted, to their Indian sisters, who are hard-working and correspondingly strong. And here from hour to hour they sit and rock, —the "Rock of Ages," I have heard it called,—a marvellous phase of sociability, strictly Spanish-American. A curious home-life indeed, that seems to have but one object, and that the killing of time, which soul-stirring occupation is pursued with a minimum of domestic effort. Family diversions are very limited, consisting of a little piano-playing, a great deal of church-going, an occasional *tertulia* (evening party), or dance, and last, but no means least, the bi-weekly *paseo* in the *plaza*, where they participate in what appears to the uninitiated a very *banal* business, the evening parade of local society, including the upper ten, the *alta sociedad*. Sometimes they go to the theatre,—the families in the boxes, the young men in the stalls, always the division of the sexes as far as

possible, carrying out rigidly the wonderful Spanish-American maxim, that if two of the opposite sex be left together, some harm is sure to follow.

The ways of love-making deserve some passing notice. Strictly speaking, in accordance with the unwritten laws of Spanish Central America, the lover is absolutely for-



THE SIESTA.

bidden to enter the house of his *inamorata*, and, even when, prior to his amatory inclination becoming evident, he be an intimate of the family, all friendship ceases the moment it is known that he is "*haciendo el oso*," "playing the bear," as they say, to one of the young ladies. Seeing that the unfortunate Romeo has to carry on his courtship in the most stealthy manner possible, the only

opportunity of speaking with his lady-love being through the *reja* of the window, where he is to be found night after night haunting the iron railings with a pertinacity that would do credit to a Yankee commercial traveller, the phrase seems somewhat of a misnomer; he certainly never gets a chance of hugging. The enmity provoked in the bosoms of the young lady's family is really remarkable. He is cut by all of them, and must ever be on guard against the sudden appearance of his probable future relations on the scene of his amorous dalliance. Such, then, are the pains and penalties of daring to fall in love, and under the circumstances the lover ought to be a very unhappy man, but I do not know that he is. Questioned on the subject, he will tell you that their methods of courtship, with the thrilling excitement to be found in stolen interviews, accomplished only by unceasing intrigue, are infinitely preferable to the tame Anglo-American custom, and that he fails to see any attraction in being allowed to accompany one's sweetheart when she takes her walks abroad or in being constantly in her company. There are, of course, exceptions to this rule of courtship among the more advanced section of society, when the lover is allowed not only to enter the house but to take his seat at the side of the young lady; everything he has to say, however, must be spoken in presence of members of the family, or at any rate of the duenna, who never for a moment leaves him alone, and under no circumstances allows herself to be caught napping. Notwithstanding all this excessive vigilance, the standard of morality is by no means high, as indeed

might be expected from the training given to men and women (but especially the convent education of the latter), and from the indolent life invariably led.

No lady receives a gentleman's visit alone, unless it be that of one of the priests, who, by the way, are generally reported not to neglect their opportunities. The privi-



UNDER THE EYES OF THE DUENNA.

leges and power of the priesthood are, however, fast on the decline, and the more intelligent section of society is gradually emancipating itself from at least the worst features of their national religion. The men of the upper classes are never seen at service, and seldom enter a church, except on the occasion of a funeral or some ceremony, but the women of all classes attend morning

mass without fail, and are very religious, in outward form at least.

Without entering too far upon the attractive but dangerous subject of the fair sex, it must be said that when quite young the women are beautiful, and at all ages proud. They have many social graces, are *sans gêne*, and understand, almost like a Parisienne, the art of making themselves agreeable. Altogether, there is something in what Joaquin Miller wrote of the Aztec City :



THE SEÑORITA.

"But, oh ! turn back from the high-walled town ;
There is trouble enough in this world, I surmise,
Without men riding in regiments down,
To die by these perilous Spanish eyes !"

Ordinary European costumes of a *pseudo* Parisian style,—the *últimas novedades* from Worth, according to the local milliners,—are worn by the ladies of the middle and upper classes, with the exception that the Spanish *mantilla* or the long black shawl (*pañolon* or *reboso*) is everywhere used in preference to the hat or bonnet, an exception to this rule being occasionally made on feast days and especially on the Thursday of Holy Week, when everyone dons elegant attire.

The street scenes are exceedingly picturesque, everybody wearing light attire of cotton, muslin, and flannel, the women being conspicuous by their bright-coloured dresses.

Those of the poorer classes wear neither shoes nor sandals, yet—or is it in consequence?—their feet are small and well-shaped. The Indian women are well-featured, some are very handsome, and all have beautiful teeth. The ordinary and almost universal costume consists of a skirt and chemise of white cotton, with a coloured scarf or a *reboso* thrown over head and shoulders.



NICARAGUAN BELLES.

The sleeveless and, to our ideas, at first sight rather *décolleté* costume, worn without any trace of immodesty, must be pronounced a rather slovenly though doubtless comfortable attire, and one well suited to the climate.

The men do not affect sport. Shooting and boating are altogether unknown, though the lakes offer ample opportunity for the latter. In the afternoon the youth ride showy horses or mules *à la française* with a

maximum of curvet and prance, and in the evenings they gamble at the club or elsewhere. Field sports are patronised only by the English or Americans. In a report by the United States Consul in 1893 I find it stated that the young men of Granada were considering a proposition to erect a hippodrome for racing, and a place for athletic games of all kinds, and that it was intended to construct public baths on the shores of the lake. These still continue to be propositions, and are likely to remain so.



NATIVE WOMAN.

The thirst for gold, a legacy of the early *conquistadores*, is very strong, and hence the popularity of gambling, mining ventures, and search for treasure. In passing a Spanish-American town, as Pim happily observes, you always hear of one of two things,—either rich mines are close by, merely requiring skill and capital to develop, or hidden treasure exists somewhere in the town, only waiting to be discovered.

With regard to public amusements, the people are

devoted to the theatre, but naturally very few passable theatrical companies come to Nicaragua, though now and again a fair Mexican travelling troupe is to be found there, playing light opera or heavy drama. Like all the peoples of the Latin race, the Nicaraguans are passionately fond of music, but most of all light or comic opera. Even if comedy or drama be played, ballad and chorus must seemingly be introduced in some form or another. The "marimba," an instrument well adapted to the plaintive but melodious native airs, is kept at all the *tambos* (resting-stages) on the main highways where the cartmen and muleteers stop.

They played Audran's "Mascotte" the night I visited the Granada theatre, during the performance of which a topical song, brought very much up to date, and rounded off with a crushing verse about the British nation, with reference to the Corinto incident, was introduced with startling success. Luckily the *impresario* was good enough to omit several verses which would certainly have exercised an unfortunate effect upon the already over-excited people, especially the youth of the city, who had been for days parading the streets, shouting "*Que mueran los Ingleses.*" Now and again may be witnessed an inferior bull-fight—or perhaps one ought to say bull-baiting, seeing that they are not allowed to kill the animal—on which occasion everybody turns out; this pastime, or gambling, alone possessing the magic power of making the Nicaraguan lose a little of his wonted indifference.

In the theatre, the railway, or steamer—indeed, every-

where—courtesy, it must be mentioned, is a marked trait. On the road the peasant invariably greets you with "God be with you," or some such fair words, as in most other countries except our own, meaning little or nothing, but still pleasant in its way.

The *cargadores* (porters) and *carreteros* (cartmen) have the reputation of being very honest, though given to pilfering small articles and cutting off leather straps, and so on. The high-roads some years ago were much infested by banditti, usually Leonese, justifying the saying: "En Leon, Cada casa un ladron." "In Leon every house holds a thief," but are now relatively free from the pest. They seem not to have molested Englishmen or Americans, confining their attentions to their own countrymen, the reason possibly being explained by the Central-American proverb, "La piel del tigre vale mas que la del chivo, pero cuesta mas." "The tiger's skin is worth more than the goat's, but it's harder to get."



THE ARRIERO.

The markets are at all times interesting, with their crowds of Indian stallholders, busily engaged in disposing of their wares, but it cannot be said that the supply and variety of fruits and vegetables come up to one's

expectation. In Managua the market building, which covers an entire square, was built by an English company holding a Government monopoly for twenty-five years; and in Granada the market was erected by the city council with money raised by a loan, the management being in the hands of the capitalists who subscribed, an Englishman being the leading spirit. Among other



MARKET SCENE.

improvements recently made have been the construction of street tramways and organization of water companies. Everywhere the agency of improvement is foreign, and usually English.

Labour cannot be said to be very plentiful in Nicaragua, even as far as present needs are concerned. To carry out any great public work, such as the canal, or to in any way develop the immense resources of the country (mainly agricultural and timber lands), on the scale necessary when proper facilities for transportation are

provided, it will be necessary to import labour, and encourage immigration. In the low-lying lands negroes, mulattoes, Zambos, and Chinese alone can work and thrive, whilst the higher lands are hardly fitted for the European field labourer, though suitable for purposes of superintendence. Experience has shown in Costa Rica that neither Germans nor Irish are suited for tropical Central America; they either succumb to disease, or become indolent like the natives.[1] Not yet have crowds of European colonists been moved from Spain, Italy, and France, and planted here, or in the neighbouring states, as in various parts of South America during the past thirty years, where they have been the chief apparatus of development in those countries. That step



A POTTERY VENDER.

[1] "The last colonization experiment in Venezuela, which cost the State some 200,000 dollars, ended no better than did the Tyrolese settlement on the Pazuga in Peru, or the attempt made in Guatemala to establish a Belgian colony at the magnificent harbour of St. Thomas. The endeavours of Von Bülow and Medina to found German settlements in Costa Rica had similar disastrous results, while the North American and German immigrants in Chiriqui, to the south of Costa Rica, again withdrew from the country as soon as the gold in the old Indian mines was exhausted."—*Central America*, H. Ed. Bates, 1882.



TRANSPORT BEFORE THE RAILWAY IN CENTRAL AMERICA.

in evolution has yet to come; meanwhile it looks as if the law against the introduction of Asiatics will have to be relaxed.

More railroads, waggon roads, and especially tramways, more facilities for transportation generally, are urgently



SCENE IN THE PORTALES.

needed. The so-called "waggon roads," along which the *carreta* creaks its weary mile per hour, are terrible. Only those who have experienced it can realize the suffering and danger of mule-back travelling across the mountains, especially during the rainy season, when the rivers are swollen, and the mountain paths one long unbroken quagmire, through which the unfortunate pack-mules struggle and sink in their arduous task of carrying

freight to and from Matagalpa (the rising coffee-raising region to the north of Lake Managua) or the districts on the Costa Rican frontier. Wages generally are low, ordinary labourers, cartmen, and farm hands earning from forty to eighty cents a day, the coffee pickers being paid by the task,—about ten cents for forty pounds of green berries. But, notwithstanding this poor remuneration, food and clothing are so cheap, wants are so few, and



CARRETA.

nature is so very bountiful that everybody seems to wear a more contented air than is usual in Europe or the States. Beggars are not unknown, but, strictly speaking, begging is prohibited except on Saturday, which is regarded as "Beggar's Day." Now and again may be seen an old man or woman, riding a broken-down nag, soliciting alms, but this seems rather the exception than the rule, notwithstanding the prevalent idea that all beggars are mounted in Spanish America.

The children are charming, and the babies pheno-



INDIAN BEGGAR.



NATIVE CHILD.

menally plump, in charge of bright little Indian attendants.

The style of domestic architecture in the towns of Nicaragua is mainly Spanish, the only opportunity of exhibiting taste or skill being in the *zaguan* (portal), and the ornamented balconied windows, the modern type of foreign building seen in South America not having yet been adopted. The houses of the labouring classes vary in solidity according to the variations of climate, in the hot lands on the coast line being very superficial structures of wood and cane thatched with palm leaves, and, in the higher regions, of *adobe* or sun-dried brick, roofed with tiles. In the dwellings of the middle and upper classes, the rooms are spacious and lofty, all the doors opening upon the *patio*, or courtyard, which is generally filled with fruit trees, flowers, and shrubs, highly-scented flowers being those most cultivated.



INDIAN NURSE-MAID.

Rents are high and have greatly increased of late, the



TYPICAL DWELLINGS OF THE LABOURING CLASSES.



UPPER CLASS HOUSE, WITH PATIO.

better class of houses renting at from £8 to £20 a month. In the chief cities the best buildings are of stone, which is abundant and easily procured, having, moreover, the advantage of being soft when first quarried, and of becoming hard with age and exposure.

Nicaragua is a republic, sovereign, free, and independent, the form of government popular and representative, its powers being defined by a written constitution, adopted in 1858. The republic is now divided into twelve departments:—Chinandega, Leon, Managua, Masaya, Granada, Carazo, Rivas, Chontales, Matagalpa, Jinotega, Nueva Segovia, and Esteli. The government has legislative, executive, and judicial branches. The legislative power is vested in a congress consisting of two bodies—the senate and the chamber of deputies. The former consists of two senators from each department, elected for a term of six years, one-third of their number, however, being renewed by election every two years; the members of the lower house, called deputies, are elected for four years, one-half being re-elected after two years.

Nicaraguan elections are very differently managed to those of Europe or the States. As a rule they take place without the people's knowledge, the result generally showing the return of the president's selection at the head of the poll. The process is as follows:—A few weeks before the date of the so-called elections, an address is circulated in which it is courteously but plainly pointed out that, while in no way wishing to bring any undue influence to bear upon the electors, in the opinion of the president and ministers Mr. X. and

Mr. Y. would be highly suitable people for such and such seats, and returned they usually are. But if the people happen not to approve of the official nominees, ah!—then occurs the revolution, that so oft-recurring feature, the *pièce de resistance* of Central American life.

What happens is this:—the different party leaders take up all the arms they can lay hands on, everybody turns soldier for the time being, and so they fight the question out. Wholesale recruiting of men of high and low rank instantly takes place, all the prominent partisans of the opposite way of thinking to the government, if they have not succeeded in making good their escape, are immediately put in prison, while the government forthwith seizes wholesale the railroads, steamers, carriages, horses, mules, saddles, and harness, shuts up the post-office, suppresses all newspapers, denies the use of the telegraph to everybody except their own supporters, and even then no private messages are allowed to be sent. The system of recruiting on both sides is very curious. Bands of *comisionados* issue into the country and press into service all they can lay hands on. The young men of the middle and upper classes of course are given commissions, those only receiving the post they covet who help the government with a little money. If a man gives, say, a thousand dollars "war subscription," and is offered the post of lieutenant, he refuses to serve unless they make him a colonel, and colonel he probably becomes, and so the process continues, the result being that the number of officers is out of all proportion to the men under their command. The government party relies principally on

the more or less disciplined troops, but, if the enemy make a successful *golpe de cuartel*, that is to say, if they succeed in seizing the barracks and disarming the *veteranos*, the troops, as a matter of course seemingly, continue the fight under the revolutionary colours. A "battle" or so may be fought, and a little blood spilt on both sides, but the whole business is soon over; if the insurrectionary party get the advantage, the government instantly retires, and so matters are arranged.

Sometimes, however, as a means of avoiding a threatened rising, they go so far as to make considerable show of opening the polling booths, and one little instance will give a pretty fair idea of what a mockery it all is. I refer to a recent election of vice-president. On the eve of the day announced for the polling, the *alcalde* of one of the larger towns despatched a batch of messengers to three hundred or so residents in the district, requiring their presence on the morrow under penalty of a heavy fine. On arriving next day, they are ushered one by one into the *Cabildo* (government building), where the *alcalde* wishes them good morning and summons his clerk, who hands each man a strip of paper neatly folded up, pointing at the same time to a box and adding: "Put it in there, please." Naturally Mr. Elector does as he is requested, after which another clerk registers his name and address, the *alcalde* comes forward and shakes him by the hand, and the next moment he is in the street asking the first passer-by what it all means. Next morning the official gazette solemnly announces that by an overwhelming majority, Mr. "So-and-so" has been

elected to the vice-presidency, and so the matter ends. And this is what is known as the strict observance of the people's right of voting.

The executive power is vested in a president, whose term of office is four years. He must be a native and resident of the republic, not under thirty years of age, not a member of the priesthood, must be the father of a family—almost a certain qualification of every candidate—and the owner of property worth not less than £800 ($4,000). The president is assisted by a cabinet of four ministers, presiding respectively over the departments of foreign affairs and the promotion of public welfare; of war, the navy, and public instruction; of the interior, police, and ecclesiastical affairs; and, lastly, of the treasury and public credit. The judicial power is exercised by a supreme court, divided into two sections, each composed of four judges and two alternates. It is hardly necessary to say that justice is very indifferently administered, redress of grievances usually being secured only by dint of influence coupled with a monetary offering. As for the laws, they exist—on paper—and that is about all that can be said. With reference to this subject I think I cannot do better than quote what Carlos Selva, an able Nicaraguan writer and politician, says on the question of liberties and guarantees in the Spanish-American republics.[1] Commencing by calling the reader's attention to the stability of European governments, and to the liberty enjoyed under them, especially that of Great Britain, he proceeds to say:

[1] "El Diarito" of May, 1895.

"And now to turn to the Spanish-American republics. Whoever knows anything of the political methods of these nominal republics will admit that their governments are indeed unstable by their very nature, even those which appear to be most strong. Do we not every day see governments disappear at the slightest impulse of a revolution or a military *coup*? Casting a glance around it will be seen that in a short time almost all the Spanish-American governments have changed at the first breath of a revolution. That of Venezuela fell in a short campaign; that of Salvador did not survive two battles; that of Honduras hardly lasted a month; that of Nicaragua changed twice in three months; that of Peru stood for a time, but fell when it was least expected; that of the Argentine changed in four days by an arrangement completed in the presence of the people in arms; and that of Chili, in spite of its traditional prestige, of its millions of money, and its forty thousand men, fell in eight days. This is sufficient to show the instability of all these powers, which are overthrown by the slightest shock, although some prolong their agony by surrounding themselves with bayonets and inspiring terror with blows and imprisonment coupled with maltreatment and enormous levies. Thus we possess governments less stable without being less oppressive, since it is their insupportable oppression which brings about these sudden revolts by which they are overthrown. Where are the liberties, the guarantees, the rights of the Spanish-American citizen? They exist in the constitutions, but only there. These are generally made very nice and liberal,

leaving nothing to be desired, except their fulfilment. . . . Such is, I repeat, the normal condition of these countries."

The Central American republics are only nominally such; as a matter of fact they are at the mercy of men who, almost without disguise, make a traffic of politics, which is the same here as in other Spanish-American lands—party faction without true public spirit. By virtue of the constitution, all persons born on the soil are free, and no person can be deprived of life, property, honour, or liberty, except by due process of law; but the breach thereof is practically the rule, not the exception. Authority to carry arms for lawful self-protection and defence is guaranteed, and so is the right to enter, reside in, travel over, and leave the republic without molestation. There is also a guarantee about the inviolability of private correspondence, which practically does not exist, as they frequently open letters, especially foreign ones. With regard to the naturalization law, citizenship may be acquired by foreigners: (1) If the applicant is a Central American, upon proof of his residence for one year within the republic; (2) If the applicant comes from any other Spanish-American republic, the residence must be for two years; (3) If he comes from any other country, four years' residence is required. All foreigners have the power, without forfeiting thereby their own nationality, to acquire public unoccupied lands on the same terms and conditions as the citizens of Nicaragua. The laws with regard to immigration and colonization are seemingly liberal, but they have not yet been carried

out to any extent, the government and the people doing very little indeed to encourage the settlement of foreigners beyond the publication of the laws. At present, the total number of foreigners of all nationalities cannot exceed six or seven hundred, more than half of these being settled in the principal cities and engaged in industrial and professional business. Taxation is indirect, the revenue being derived from import duties, stamps, the government monopolies of tobacco, liquors, and gunpowder, the toll on cattle exported, and the sale of unoccupied lands. Real estate is exempted from taxes, but the municipal rates are high.

Nicaragua is a Roman Catholic country, and, though having no longer a state religion, like the sister republics is still to a considerable extent priest-ridden. It would be difficult to exaggerate the mighty influence of the Church in the past, now, however, waning, as already noted. Rigidly watching over the community, having her will in nearly everything, she has been, by the tacit consent of the government, stronger and more tyrannical than the government itself, and woe to the unfortunate and misguided soul who dared to say her nay. No person, according to the Nicaraguan constitution, can be molested on account of religious ideas, which may or may not be the case. Public instruction is under the direct control of the government, which, in this respect, deserves a word of praise for spending so much on the maintenance of the schools. Until quite recently there existed two universities—in Leon and Granada—holding powers to confer academical degrees, but a decree pro-

mulgated by President Sacasa some years ago consolidated the two into one. There is but one public library in Nicaragua, and that must be pronounced a poor one, supported by government, and free to the public, containing a small collection of foreign and American works, and numbering some 7,000 volumes and 600 pamphlets.

And now a word in conclusion. When we come to note the efforts made upon a larger or smaller scale to break through the many barriers hindering advancement, it would be unjust to accuse Nicaragua, together with the rest of the Spanish-American republics, as is too commonly done, of having failed to attain a high degree of civilization and progress. Rather should we consider what it means to build up a civilization, and commend them for having made some headway in face of so many disadvantages, to a large degree an inheritance from their quondam rulers, the Spaniards. It is usual to talk of these peoples as possessed of an innate and inordinate desire for disorder and revolution. But the reason given by Elisée Reclus, that the physical difficulties have conspired to prevent any close union of the various states, which has much force, and the *faute de l' habitude de gouverner*, as Napoleon I. called it, have been largely responsible. Faithful to tradition, the Spaniard has ever held but one view of colonial statecraft,—the dependencies of Spain for the Spaniard and for no one else. Unwilling to allow the sons of the soil to have any voice whatever in the matter of administration, upholding a rigid conservatism in everything, treating the natives as inferiors, and maintaining their supremacy with an amount of

treachery and want of good faith that has few equals in the history of nations, what has been the result of such a blind administration? The loss of all but two of their vast dependencies,—one of these now making another effort for freedom,—and the painful traces even to-day to be found in the existing republics of her tyrannical doctrines and arbitrary rule, coupled with the *nonchalance* and indolence that are inherent to the Spanish character. This spirit, brought about by Spanish rule and the infusion of Spanish blood, still has a strong hold on the peoples of the American republics. Bearing these facts in mind, one must in all fairness adopt a charitable spirit when comparing their advancement with that of European nations or the people of the United States.

Public education established conformably to the progress of science, bringing with it a better sense of civic duty, the encouragement of foreign immigration and agricultural enterprise, of new industries and facilities for transportation, attracting the civilizing influences of the United States and the countries over sea, will gradually overcome present obstacles and open the path to that state of advanced civilization which assuredly awaits these countries, where nature has lavished her richest gifts and granted inestimable privileges to a people who may know how to be grateful for and utilize them.

Chapter IX.

PRINCIPAL TOWNS. RACES. LANGUAGES. REMAINS.

Principal Towns.

THE populations of the principal cities and towns are :

Leon	about	35,000.
Granada	„	15,000.
Managua	„	18,000.
Chinandega	„	12,000.
Rivas	„	8,000.
Masaya	„	18,000.
Greytown	„	1,000.
Corinto	„	1,000.

The most important city is Granada, situated in a lovely country on the north-west shore of the lake. The chief town of the province of the same name, extending northwards to Lake Managua, Granada, founded in the year 1522 by Hernandez de Cordova,[1] was entirely

[1] "Hernandez de Cordova founded the cities of Leon and Granada, and built fortresses in them, for defence. This land was very populous and fertile, yielding supplies of maize, and many fowls of the country, and certain small dogs which they also eat, and many deer and fish. It is a very salubrious land. The Indians were very civilized in their way of life, like those of Mexico, for they were a people who had come from that country, and they had nearly the same language."—Andagoya, p. 32.

burnt to the ground by the filibuster Walker, in 1856. It was soon after rebuilt, and has spacious streets, crossing each other at right angles, and a large public square. The streets are laid in a peculiar manner, running for distances of fifty paces or so on a level, and then suddenly rising by a steep incline to another level stage. There are



PALACIO NACIONAL, MANAGUA.

several churches, most of them ill cared for. Granada has an air of liveliness for a Nicaraguan city. It has one industry, the preparation of the locally much admired "Panama" chains, made of gold wire. Managua, the capital, is well situated on the lake of the same name; a recent place, built on the site of an ancient Indian town. Masaya is mainly an Indian town, and here are found



MANAGUA, THE CAPITAL OF NICARAGUA.

the best examples of the native life and customs. Rivas, situated in a fertile country, is known as "the garden city." Until the beginning of this century it was known as Nicaragua, and here, at the time of the conquest, resided the chief Nicarao, whose name the Spaniards gave to the whole country. The village of



THE CATHEDRAL AT LEON.

Castillo contains merely one narrow, rough and wretched street.

Like Granada, Leon[1] (situated in the midst of the

[1] Of Leon, Gage, who travelled about 1590 in Nicaragua, says:—"It is very curiously built; for the chief delight of the inhabitants consists in their houses, in the pleasure of the country adjoining, and in the abundance of all things for the life of man. They are content with fine gardens, with the variety of singing-birds and parrots, with plenty of fish and flesh, with gay houses, and so lead a delicious, lazy, and idle life, not aspiring much to trade and traffic, although they have the lake and

great plain of the same name, about midway between the lake and ocean) suffered from the attacks of the pirates during the period of their power in the South Sea. In 1685, a party of English freebooters, amongst them the celebrated Dampier, surprised, captured, and sacked the



RAILWAY STATION AT GRANADA.

city, and burnt the cathedral, the convent of La Merced, the hospital, and many of the principal houses.

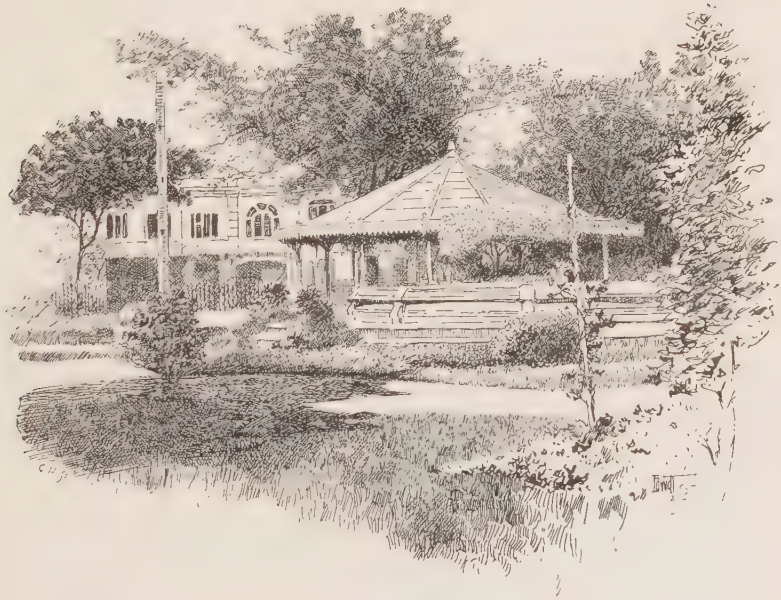
Corinto owes its sole value to its being the terminus of the railway on the Pacific. Since the cessation of

ocean near them. The gentlemen of Leon are almost as gay and fantastical as those of Chiapas; and it is especially from the pleasure of this city that the province of Nicaragua is called Mahomet's Paradise."



ON THE OUTSKIRTS OF MASAYA.

work on the canal, Greytown has greatly decreased in importance, and now contains probably a population of not more than one thousand souls. This dwindling process has been due not entirely to the stoppage of the canal works, but partly to the diversion of traffic from the



A PARK IN CENTRAL AMERICA.

interior to Corinto (on the Pacific), a result brought about by the improved railway facilities on the Pacific side, and the inferior means of transportation by the San Juan river towards the Atlantic, a subject which has been elsewhere referred to.

Greytown lies on a well sheltered harbour, about two miles inside the bar, near the mouth of the northern out-

let of the river San Juan, the main branch of which, the southern one, is called the Colorado. The buildings are generally of wood, with verandas such as are usual in tropical countries. As might be expected, the atmosphere is hot and moisture laden; and the vegetation may be termed luxuriant or rank, according to the view which the observer may take. The water is said to be bad,



A NICARAGUAN HAMLET.

and the inhabitants, I noticed, generally avoid its use as much as possible. When at Greytown, I felt as if I were in a perpetual vapour bath, and found people everywhere using fans made from the palm leaf; the climate seemed to me to be very similar to that of the coast lands of Burmah and Indo-China generally. Inquiries made by me went to establish the fact that, though debilitating and certainly not agreeable, the climate is not a particu-

larly unhealthy one. It seems that the employés of the Construction Company did not suffer to any unusual extent from sickness. This bears out the favourable sanitary statistics of the medical men on the staff of the Company, as published in the official reports. The comparative healthiness of Greytown is due to its



MAIN STREET, GREYTOWN.

situation on volcanic sand, and its exposure to the full force of the trade winds.

On a low sandy beach extending seaward, and flanking the harbour and bar, separated from Greytown by the mouth of the canal, are situated the buildings of the Canal Company (storehouses, offices, mess-rooms, officers' quarters, etc.). These are placed on the site of the future

city of "America,"[1]—founded on the 1st January, 1890—in front of which lies the harbour bar, and beyond it the jetty, which, with the assistance of dredges, is to give a depth of water at the entrance sufficient for the largest vessels.

An air of deep depression hangs over Greytown; business seems to be almost non-existent, and people are



SOME OF THE CANAL COMPANY'S BUILDINGS AT GREYTOWN.

waiting for the canal, to which they look to make the fortune of the place. I am not inclined to believe that Greytown will ever become a place of great importance; some city on the lake will have a far better chance; and the prospects of a "boom" on any considerable scale are, I should think, somewhat remote. But "booms" have been manufactured in far less likely places.

[1] The "city" of Corinth, laid out on the south shore of the harbour of Realejo, never came to anything.

Nicaragua, enjoying some of the richest gifts of nature, provides conditions eminently favourable for sustaining a vast population. That this is the case is amply proved by the numerous remains (sepulchral mounds, monumental ruins, etc.), and by the testimony of the ancient chroniclers, according to whom it was one of the best-peopled countries of Central America.[1] Its inhabitants were decimated by war, slavery, torture, and pestilence until but a remnant remained.[2] Indeed, so rapidly were they reduced in numbers that early in the sixteenth century negro slavery was introduced and continued to be a legalized institution until 1824, when it was abolished by the Republics of Central America, the owners being compensated.

The present population of Nicaragua, according to the last census, is 360,000 inhabitants (16,200 white, 198,000 Indians, 1,800 negroes, and 144,000 of *mixed races*), little more than seven to the square mile. The inadequacy of the population is shown by the calculation

[1] Mention is made of other cities four miles in extent; and when Gil Gonzales penetrated into the country in 1522 he found in one district a cluster of six considerable towns all less than two leagues apart. But "a few years of Spanish rule sufficed to turn whole tracts of flourishing country into uninhabited wilds."—H. H. Bancroft.

[2] "No mines have been found, except seventy leagues from Leon; and by taking the people from a warm and level country to dig out gold at such a distance and in high mountains, a very large part of the population has disappeared; and afterwards, there being no one to cultivate the land, the Spaniards began to make slaves, and to reward the chiefs who brought slaves to them. They were taken in great numbers to be sold at Panama and in Peru; and these are the reasons why this country is now so much depopulated."—Andagoya.

that the country could support with comfort several millions. In Nicaragua, as throughout Central America, females exceed the males in number.

The Indians, who form the bulk of the labouring class, are intelligent, docile, honest, and industrious—an excellent rural population. They mostly live in towns and villages, necessitating, in many instances, a journey of several miles to and from their labour, a practice due to the necessity for mutual protection during times of disturbance through which the country has passed. This fact has led travellers, when passing through the country, to estimate the population to be even more scanty than it really is, as one may go many miles without seeing a house and meeting but few people. The question of immigration has been discussed elsewhere.

According to Mr. A. H. Keane, the best authority upon the aboriginal races:—"With the exception of some wild tribes in the interior of Mosquitia, nearly all the natives are now in a more or less civilized state, and have generally adopted the Spanish language. At the time of the conquest Herrera tells us that five distinct languages were current in Nicaragua:—the *Caribisi* (Carib) on the east coast, now represented by the Rama, Toaca, Poya, and Waikna (Mosco); the *Chontal* of Chontales, Segovia, and parts of West Honduras and Salvador, now represented by the Woolwa in Chontales and Mosquitia; the *Chorotegan* (Dirian), mainly between Lake Managua and the Pacific, and thence north to Honduras, now extinct; the *Orotiñan* between Lake

Nicaragua and the Pacific (department of Rivas) and thence south to the Gulf of Nicoya (Costa Rica), also extinct; the *Cholutec* (Niquiran), a pure Aztec dialect spoken in the large islands of Lake Nicaragua, and about Masaya, Granada, and other districts, especially along the north-west side of the lake, where it still survives among a few scattered communities. The presence of Aztec settlements in this region, and, at one time, even amongst the Chontales of the opposite side of the lake, is abundantly established by this survival, by the archæological remains found in the islands and adjacent mainland, and especially by the Aztec geographical nomenclature widely diffused throughout the whole of West Nicaragua, *e.g.*, Popogatepec = Popocatepetl, the local name of the Masaya volcano; Ometepec, or Ometepet = Ometepetl, *i.e.*, 'Two Peaks,' the largest of the islands in Lake Nicaragua; the leading *galpa*, common in Chontales (Juigalpa, Matagalpa, etc.), which is the Aztec *calpa*, group of houses, town, from *calli*, house. The euphonic changes *c* or *t* for final *tl*; *g* for *c*, etc., occur even in Mexico itself, and are important as showing that the Cholutecs are comparatively recent intruders from the Anahuac plateau, not the original stock of the Aztec nation, as has been suggested by some ethnologists.

"Besides the Caribisi, or continental Caribs of Herrera, the Mosquito Coast is occupied by other Carib communities, which are descended from the Caribs, removed thither from the island of St. Vincent by the English in 1796. To these alone the name of Carib is now applied, although they are not pure-blood Indians, but Zambos,

in whom the negro features greatly predominate. The Woolwas of the interior of Mosquitia and Chontales are divided into a great number of tribes collectively known as Bravos, that is, wild or uncivilized, who live chiefly on hunting and fishing, and are practically independent of the Nicaraguan Government. The term Bravo itself is the exact Spanish equivalent of the Aztec Chontal, Chondal, that is, 'barbarian,' which at the time of the discovery was applied by the Cholutecs to all the tribes dwelling east of the great lakes and on the Cordillera de los Andes as far north as Honduras and San Salvador. Here they seem to have supplanted a still more ancient race, who had attained a high state of civilization, as attested by the already-mentioned monuments and stone sculptures of Chontales, which are of a different type both from the Aztec and the Maya-Quiché remains of Yucatan and Guatemala."

The total population of the Mosquito coast is about 3,000, consisting of mixed tribes, amongst which the Mosquitos proper, the Woolwa, Rama and Sumu, are indigenous, the Caribs having settled in more recent times.

In many districts colossal monolithic statues of men and gods, crumbling temples, cairns, and tombs of all sizes are met in every direction. One explorer speaks of "mountains of earthenware," and another tells us that "around Libertad the tombs are in thousands, offering every possible variety of form, size and thickness." Monuments of this sort have been found ranging from 20 to over 170 feet in length and 120 in breadth, built of

huge stones piled up 5 feet in thickness, which must have been brought from great distances.

Squier, whose explorations in Nicaragua[1] are the most important that have yet been carried out there, says:



A GROUP OF SUMU INDIANS.

"The islands of Momotombito, in Lake Managua,

[1] Mr. Squier's explorations form a fitting sequel to those of Mr. Stephens, extending as they did over an adjacent territory, equally rich in the relics of the ingenious and civilized race of aborigines, which once peopled it. Almost every article of their manufacture, which was not readily perishable, is represented in the excellent engravings. Their idols, temples, columns, sculptures, utensils, and architecture, are most copiously illustrated and clearly described. A division of the second volume, entitled "Aborigines of Nicaragua," treats of the Indians now resident in that portion of the peninsula.—(Field's "American-Indian Bibliography.")

Zapatero, in Lake Nicaragua, and Pensacola, close to Granada, contain a large number of interesting monuments and antiquities. This island was anciently inhabited and called Cocobolo. Many idols and statues have been found, mostly representing males, and but few in which the sex is not distinguishable. The reason for these distinctions may be found in the fact that the doctrine of the Reciprocal Principles of Nature, or Nature Active and Passive, male and female, was recognized in nearly all the primitive religious systems of the New as well as of the Old World, and in none more clearly than in those of Central America. In a ravine not far from Masaya, are *piedras labradas*, inscribed rocks, covering the face of the cliffs for more than a hundred yards, and consisting chiefly of rude representations of animals and men. Far too rude to be of much archæological value, they have little interest beyond illustrating the first steps in a system of pictorial representation which it is supposed subsequently became refined into a hieroglyphic, and finally into an alphabetical system. Some of the statues are very bold and striking, a few being cut with a freedom rarely to be found in the statuary works of the American aborigines." [1]

The early writers, Gomara, Andagoya, Acosta, Las

[1] "Nowhere in Nicaragua have traces of ruined cities been found, nor even what may be regarded positively as the ruins of temples or other buildings.

"I come secondly to the hieroglyphic figures cut or painted on Nicaraguan cliffs. These appear to belong for the most part to that lowest class of picture-writing common throughout the whole length of the

Casas, Herrera, Ulloa, and others, contain a mass of curious information on the country and its inhabitants. The scope of my work, however, has only permitted me to quote sparingly from these authorities, and a couple of passages from Andagoya is all that can be given here.

"These people went about well dressed in the Indian fashion; the women with their mantles like those of Coiba, and another description of covering which, descending from the head, covered the bosom and half the arms. The men covered their loins with very long cloths made of cotton, which they passed in many folds from the hips to the thighs. In the villages they wore their mantles like cloaks under the arms. They had a great quantity of cotton cloth, and they held their markets in the open squares, where they traded. The land was poor in gold, and they traded with cacao, as in New Spain.

"They had another custom, which was that when one of them was married, a man whom they held as a pope, and who lived in a temple, had to sleep with the bride on the previous night. In this temple there was a statue of

North American continent, even in the territory of the most savage tribes.

"Nicaraguan antiquities give rise to but little discussion or visionary speculation. Indeed there is little of the mysterious connected with them, as they do not necessarily carry us further back into the past than the partially civilized people that occupied the country in the 16th century. Not one relic has appeared which may not reasonably be deemed their work, or which requires the agency of an unknown nation of antiquity. The relics are over 300 years old, nothing in themselves proves them to be less than 3,000."—H. H. BANCROFT, vol. iv., ch. ii., pp. 29, 34, 67.

gold, to which they sacrificed through the instrumentality of him, who was there as priest, and their sacrifice was that, in the presence of the statue, they tore out the hearts of men and women who were sacrificed, and anointed the statue with them. They also cut out the tongues with certain stones like razors, and anointed the statue with them. Likewise they offered up much game and fish, and other eatables, and of these the priest, who resided there, did eat. The Indians made a sort of confession of certain sins which appeared to them to be heinous, and they thought that, by confessing them to this priest, they were freed from them."

Chapter X.

GEOGRAPHY, PHYSICAL FEATURES, MINES AND MINING.

Geography and Physical Features.

THE territory of Nicaragua (comprised between the limits of 10° 41′ and 15° north latitude, and 83° 15′ and 87° 40′ west longitude) has for its boundaries: on the east, the Caribbean Sea; on the south, the Republic of Costa Rica; on the west, the Pacific Ocean; and on the north, the Republic of Honduras. It contains over 50,000 square miles, an area nearly equal to that comprised by England, or the combined states of Maine, Massachusetts, Rhode Island, and Connecticut. In shape it resembles an isosceles triangle, the base being the Caribbean coast, and the apex the cone of the volcano of Cosigüina, on the Bay of Fonseca.

The boundary between Nicaragua and Costa Rica—which has recently acquired importance from the proposed canal—long in dispute, was defined by a treaty between the two republics, concluded on April 15, 1858. The claim being made by Nicaragua, however, that this treaty was invalid, the question was submitted to the

arbitration of President Cleveland, who, on March 22nd, 1888, declared its validity, and gave interpretations of all doubtful points.

The Caribbean coast of Nicaragua measures about 300 miles from north to south, 150 miles being comprised in the "Mosquito Reservation."[1]

The ports of entry on the Atlantic side are Greytown (San Juan del Norte), Cape Gracias á Dios, and Bluefields. The port of Greytown, as shown elsewhere, was formerly a splendid harbour, having thirty feet of water at low tide, but has gradually silted up. The Canal Company, by means of a breakwater, built in 1891, combined with the use of powerful dredges, improved the harbour, which, however, since the cessation of work, has completely silted up again. The bar is very troublesome and, at times, dangerous. The port of Gracias á Dios, in former times an excellent harbour, now has scarcely fifteen feet of water at the deepest place. Vessels have to cast anchor at some distance outside the bar, and the landing of passengers or merchandise is difficult, and frequently dangerous. In consequence of the great development of the trade in bananas and other tropical fruits, for which regular lines of steamers from the United States have been established, Bluefields is assuming a position of importance as a port. The lagoon has an

[1] The limits, as settled by the treaty of 1860, are inclosed in a line commencing at the mouth of the river Rama, thence up the midcourse of that river to its source, thence due west to the meridian of 84° 15′ longitude west, thence due north up the said meridian to the river Hueso, and down the mid-course of that river to the sea, and thence southerly along the shore of the Caribbean Sea.

area of 100 square miles, in some parts of considerable depth, but it suffers greatly from the deposit of sediment brought down by the Bluefields (Mico) and other smaller rivers which empty into it.

The Pacific coast of Nicaragua is about 200 miles in length, reaching from the Gulf of Fonseca to the bay of Salinas. The water is deep close to the shore, neither reefs nor shoals render navigation dangerous, and the volcanic peaks, visible at a distance of many miles, form admirable landmarks for the guidance of the navigator. The swell of the Pacific rolls in on the sandy beach and forms a constant heavy surf. The bay of Fonseca (of which Nicaragua possesses a share with the neighbouring republics of Salvador and Honduras), is said to be the finest port on the entire western coast of America. It contains several good interior harbours, and has the appearance of having, like the lakes of Nicaragua[1] and Managua, once been an inland sea, which has been opened to the ocean by some mighty convulsion of nature, with an outlet eighteen miles in width. From the southern shore of this great bay, belonging to Nicaragua, a wide creek or inlet, the "Estero Real," extends some fifty miles into the interior, having at a distance of thirty miles from its mouth a depth of three fathoms. The bay of Salinas forms a deep port, nearly circular in shape, embracing an area of about eight square miles, the centre

[1] "Le creux le plus profond est de 82 mètres, et par conséquent descend en contre-bas du niveau de la mer avec laquelle le lac communiquait jadis, ainsi que le prouvent les animaux d'origine marine qui le peuplent encore, le *pristis antiquorum*, et un requin, *eulamia nicaraguensis*."—RECLUS, vol. 17, p. 499.

of which marks the western end of the boundary line between Nicaragua and Costa Rica.

The ports of entry on the Pacific are Corinto and San Juan del Sur. The former, now familiar owing to its recent occupation by the English, is one of the best-protected ports on the coast; it is a part of the ancient port of Realejo (an arm of the sea merely), in former times one of the best in Spanish America, now become shallow and in many places overgrown with mangrove trees. Corinto, the terminus of the railroad from Lake Managua, is regularly visited by the Pacific Mail Company's steamers. Brito, now merely a roadstead, has been selected as the Pacific terminus of the canal. San Juan del Sur has a small but deep and safe harbour, with an entrance about half a mile in width, situated between piles of rock more than 400 feet in height. It was brought into prominence between 1851 and 1855 as the Pacific port of the Nicaragua transit line, *viâ* the lake and San Juan River, by which many thousands crossed the isthmus to reach the Eldorado of California.

The topographical features of Nicaragua, as can be seen from the maps, are largely determined by two mountain ranges, traversing the country in a general direction from north-west to south-east. The western or coast range commences in the high regions of Guatemala, and, extending through Salvador, Honduras, and Nicaragua, terminates in the great knot or group of the Costa Rican mountains. It follows the general direction of the coast at a distance from the sea of only 10 to 20 miles, there being therefore no considerable streams discharging

into the Pacific Ocean. This is the principal line of volcanic energy, and is marked by the volcano, 3,000 feet high, of Cosigüina (which has been inactive since its tremendous eruption in 1835); Madera, 4,590 feet; Ometepe, 5,747 feet; Mombacho, 4,583 feet; Masaya, 2,972 feet; Momotombo, 6,121 feet; and El Viejo, 6,256 feet, these altitudes being above the surface of the surrounding country. As reference is made to this subject elsewhere, it is here only necessary to note that there are also many other lesser volcanic peaks, some of them showing evidences of recent activity, others bearing no traces of comparatively late eruptions, and others again of which no traditions even of such energy seem to exist.

The eastern range enters Nicaragua from Honduras and extends in a general south-eastern direction until it reaches the San Juan river, at a point about 50 miles from its mouth. It sends out numerous spurs towards the Caribbean Sea, between which flow the many rivers and streams that make their way to that coast. Between the two ranges lies the great interior basin, comprising an area of nearly 300 miles in length by 100 wide, in which are situated the two lakes, which form such an important feature of the country. These inland seas, now draining into the Atlantic, both geologically and geographically belong to the Pacific, and were both, at one time, portions of an inlet communicating with that ocean, surrounded and shut off from all communication with the Atlantic by the encircling mass of the Central American Andes, which created a mountain-locked basin

for this inlet, shut in on all sides except in a north-west direction, where it communicated with the Pacific.

The fluvial system of Nicaragua lies almost entirely to the eastward of the mountain ranges, and consists of numerous rivers, the principal being the Coco, the Grande, the Bluefields (Mico), and the San Juan. The Coco, towards the Honduran frontier, about 300 miles in length, flows into the Caribbean Sea near Cape Gracias á Dios. This stream, called Wanks by the English mahogany-cutters who had settlements on its banks, has also been known by various other names. Although receiving the waters of numerous streams, running through a narrow valley, it does not carry a volume of water proportionate to its length.

The Grande (Matagalpa) river, 230 miles long, rises in a sierra in the department of Matagalpa, receiving in its course the waters of many small streams and several considerable rivers. For a distance of 100 miles from the sea it averages 300 yards in width and 15 feet in depth, and would be navigable for vessels of moderate draught, were it not for the bar at its mouth, which is very dangerous and seldom has more than eight feet of water. The deepening of the water on the bar would be an expensive matter, but this river will one day doubtless be opened to commerce.

The Bluefields river (sometimes called the Mico or Escondido) has its source in the mountains of Chontales, and, on its course, receiving the waters of many streams of more or less importance, flows through a region covered with magnificent forests, discharging into the

Bluefields lagoon, a land-locked and well protected harbour. For a distance of about sixty-five miles, to the Boca de Rama, small steamers ascend without difficulty, and should the contemplated deepening at the bar be carried out, ocean vessels will be able to reach the same point.

The San Juan river, a beautiful tropical stream, infested by alligators,[1] forms the outlet through which are dis-



SCENE AT BLUEFIELDS, MOSQUITO TERRITORY.

charged the waters of the great hydraulic system of Lake Nicaragua. Its navigation is interrupted by rapids and rocks at several points, but it is used by the small and light-draught steamboats of the transit company to carry passengers and freight between the Atlantic and the lake. It is about to be brought prominently to the

[1] Andagoya says :—" In all the rivers which enter the sea, there are a great quantity of those serpents which we call lizards. In the rivers they do people harm ; but on the land they are very torpid, though they are ready to resist and defend themselves, yet they cannot run fast."

notice of the world, as its waters are to be used as a part of the system of inter-oceanic communication.

There are several islands near the Caribbean coast, the most important being St. Andrews, Old Providence, and Great and Little Corn Islands. These two latter have been claimed by the Mosquito authorities; but, on the ground that the treaty of 1860 defines the Caribbean coast line as the limit of the reservation, the Nicaraguan government has ignored their contention and established a post on Great Corn Island with an official in charge. Banana and cocoa-nut growing are the industries of this island, situated about thirty-eight miles from Bluefields and eighty-two from Greytown.

Mines and Mining Laws.

The liberal code of mining laws of Nicaragua, based upon the old Spanish laws, is a voluminous book of 112 pages, published in the year 1877, and revised in 1892.[1] Mining machinery is admitted free of duty, and there are no taxes, either government or municipal, levied on mines. There is no distinction between foreigners and natives in the right to acquire and hold mining property.

Generally speaking, the north and west contain rich mineral resources and many mines, some of which were once famous, and there is no doubt that, under conditions of peace, good government, and improved communication,

[1] The most important part of this Code will be found in Bulletin No. 40 of the Bureau of the American Republics; "Mines and Mining Laws of Latin America."



SCENE AT GOLD MINE IN NICARAGUA.

the influx of capital and labour would rapidly make this a flourishing mining region. Chontales is a very rich district, where profitable mines are now in active operation, and Matagalpa requires only capital and improved means of transportation to develop its latent wealth.

Very little reliable information is to be had regarding the mineral resources and mines actually in operation. The best account is to be found in a report by U.S. Consul Newell,[1] based very largely on information obtained from Señor José D. Gamez, of Managua, from which some of the following particulars are taken :

Besides the vast mountain system extending to the Atlantic, rich in minerals, but as yet unexplored, there are the auriferous mineral districts of New Segovia and Chontales, which produce the gold ore now exported. The mineral district of La Libertad, in Chontales, is the most ancient as well as the best developed, though the machinery is still of the most primitive character, the yield of the mines varying from half an ounce to two ounces per ton, and the quality of the gold being from 14 to 20 carats. Most of the machinery used is moved by rude hydraulic turbine wheels and primitive steam-power. The machinery generally consists of one or more batteries of four large mallet triturators of the Californian system, the ore being beaten or ground in cups. In Boaco there are two mines operated in the crudest way, one worked by means of an old mallet engine, the other by the ancient system called "molinette."

[1] United States Consular Reports, September, 1893. Report of Consul Newell.

In the department of Segovia the mines are richer, but the terribly bad condition of the roads makes the introduction of machinery very difficult and costly, so that no gold vein yielding less than one ounce per ton is worked. All the hills, and almost all the rivers, in that department contain veins, placers, and pockets of gold and silver, croppings of copper, tin, antimony, lead, and other metals.

In the mineral districts of Jicaro, Murra, Los Encinos, and Las Vueltas there are no less than twenty gold mines in operation, with six plants of machinery of ancient construction. The district of Telpaneca, which comprises also San Juan and El Pericon, has at least twelve non-producing mines, and there are mines of extraordinary richness in the district of Cuje which cannot be operated with profit for the want of running water to triturate the ore. Most of the mines in this district are operated by the system of "molinette."

Throughout Segovia, Chontales, and Matagalpa, are found vestiges of placer diggings that were worked with profit in the days of the Spanish conquerors, the richest of these, however, being those along the Prinzapulca and Wawa rivers, on the Atlantic coast. Dr. Mierisch has made an important geological study of the Prinzapulca district, having analyzed ores from thirteen of the mines of that section, and has made a voluminous report on the subject which, however, has not been published. It seems impossible to secure any reliable statistics as to the output of the placer mines.

But every river flowing into the Atlantic and Pacific



GOLD MINING IN NICARAGUA.

contains gold, and on the Atlantic side, in some of the rivers where placer mining has been carried on in a very crude way for years, many thousand ounces of gold of a very high quality have been taken out. One peculiarity of the gold in these placers is the large proportion of coarse metal which is found. It is quite a common thing to come across nuggets of from one to five ounces in weight, and the gold is generally larger than a pin's head, and much of it averages the size of a linseed.

The "molinette" system is the same as that known in Mexico as the "arastra." The arastra is composed of a circular granite-paved bottom, from 6 to 20 feet in diameter, surrounded by a wooden inclosure over 2 feet high, with a vertical wooden shaft in the centre provided with two or more projecting arms, to which mullers, composed of large blocks of granite, are attached by means of chains. This primitive, but effective, machinery is operated by mules when water-power is not available. The mullers make from six to ten revolutions per minute, with a capacity of grinding, in a day, from one and a half to two tons of rock (the fragments being broken as small as a hen's egg, or less).

Within the last few years a new mining district has been discovered and opened up in the district of Sauce, in the department of Leon. The gold belt runs from the Atlantic through Nueva Segovia, Jicaro, San Juan Talpaneca and Sauce, right away to the shores of the Pacific, within a few miles of which gold and silver veins of varying richness have been found. It seems probable,

from recent developments, that this part is richer in gold than the central portion.

About four years ago, a powerful English company, with its head offices in London, purchased and opened up some mines in this district, known as the Santa Francisca, and San Luis mines. The representative of his company in Nicaragua was Mr. A. E. Morgans,—a mining engineer of experience, well known throughout Central America,—under whose direction these properties have been developed.

Trials were made with an experimental plant, and many thousands of tons of ore were crushed, yielding two to two and a half ounces of fine gold per ton, and this without selection. The veins are believed to be true contact veins, having porphyry hanging walls and basalt foot walls, varying in width from 4 feet to 70 feet, the pay streaks being often 10 feet wide, sometimes reaching 20 feet, and seldom going below 6 feet.

These mines are very favourably situated for exploration and development, as they are only thirty miles distant from the town of Leon, with which they are connected by an excellent cart road. The government railroad between Corinto and Granada passes Leon, so that the mines in this new district are within easy reach of effective railway communication.

The company referred to own something like two miles of this reef, and have now a large plant of the most modern kind in full operation.

I understand that this company has offered to take over the entire system of railways now existing in the State,



GROUP OF WORK-PEOPLE AT GOLD MINE.

and to connect the Atlantic and Pacific by rail; also to carry a line through the coffee districts of Matagalpa, etc., to the navigation point on the Rio Grande.

In addition to these mines there are several others in the district which have lately been discovered, known as the Espronceda, San José, San Rafael, La República, Las Mercedes, etc., most of which are controlled by the English company. I was unable to visit these mines, but the local opinion of them is high, and it is probable that the extensive developments now proceeding will make this one of the most important mining centres of Central America.

Although the mining in this portion of the belt is in the coast lands, the occupation is by no means unhealthy. Malarial fever of a mild type exists, but Europeans can live and work well here, as is proved by the large number of white men now engaged with the company. A curious fact in this connection is worth mention. I was assured that malaria increases in all these coast lands when the timber and undergrowth are removed, as the rays of the sun then reach the rich but rotten dark clay soil abounding in this district from which the malarial germs emanate.

It is probable that the gold-mining belt of Nicaragua is a valuable and extensive one, stretching from the boundaries of Honduras to those of Costa Rica. Through the whole of the geological formation of porphyry and basalt, quartz veins containing gold and nearly always silver are found in all directions.

An important feature in connection with the question of mining and the future development of the country is

that the native Indians are clever and honest workmen. I heard, on authority which I cannot question, that these men can be employed in every branch of mining operations. They have a natural genius for mining, and are born metallurgists. These remarks apply especially to the States of Honduras and Salvador. The natives of Central America generally are a fine race, their honesty and endurance being remarkable.

Chapter XI.

RESOURCES OF NICARAGUA.

Forests and Fibrous Plants.

THE forests of Nicaragua, covering so large an area, are an element of wealth, and, with greater accessibility to the markets of the world, resulting from the opening of the canal, will develop a great industry. A small beginning in this direction has been made in the neighbourhood of Bluefields.

The mahogany (caoba), the monarch tree of Central American forests, is abundant in Nicaragua, growing to an enormous size, frequently measuring 40 to 50 feet in height below the first branches, and 9 to 12 feet in diameter at the base. At a short distance the tree is a magnificent object, its giant arms stretching over a wide space, surmounted by a great dome of verdure, at certain seasons of the year coloured with hues like the autumnal foliage of northern climates. This change of colour is the guide of the mahogany hunter, whose difficult duty it is to find the trees in the dense forest and point them out to the choppers. He climbs the highest tree he can find, locates the spot where they are growing, cuts a way

through the undergrowth, and carves on the trunk his employer's mark. This wood has long been appreciated for its beauty by cabinet-makers and for decorative work, but its value for shipbuilding and other similar purposes has not been estimated as highly as it deserves. It is



CARTING LOGS IN MAHOGANY FOREST.

said to be in all respects better than oak ; is slow to take fire, is free from dry rot and from acids (the non-corrosion of metals is a very valuable property), and does not suffer from any change of temperature. The tree can be cut at any time during the year, but is generally felled in the dry season (between October and May), when the branches are lopped off and the logs squared. They are then drawn by oxen to the nearest water-course,

where they are rafted and allowed to remain until the high water of June or July, when they are floated to the port of shipment. A firm, Messrs. Emery and Co. of Boston, had camps on a large scale along the rivers (on the East Coast), but stopped their very extensive operations this year. The reasons are uncertain; but they



MAHOGANY LOGS READY FOR RAFTING.

were reported to be that the market was overstocked, and that a heavy tax on felling timber had been imposed by the Nicaraguan Government.

Second only to mahogany in beauty and value is the cedar (cedro), so well known from its extensive use for pencils and cigar boxes. In Nicaragua it is abundant, growing to an immense size, and producing wood of the

finest quality. It can be worked as easily as pine, and when polished is as effective as mahogany, while its aromatic odour preserves it from the attack of insects. Like the common red cedar of the North, it is very durable, and is not liable to rot when exposed to damp.

The wild cotton tree (ceiba) grows rapidly and to great size, has trunks of 70 feet in length and 14 in diameter near the root, and is useful for building purposes; lighter than pine, though not so durable, it can be worked very easily. It is largely used by natives to make canoes, or "bongos," many of them of large size, hollowed out from a single log, and is also employed for making barrels. It produces large pods, filled with a downy substance like floss silk; the shortness of the fibre renders it difficult to use for textile purposes. It is frequently used for stuffing cushions, pillows, etc. These trees were very numerous on the clearing for the canal line extending some ten miles from Greytown.

The *guanacaste* is notable for the immense size it attains and the enormous spread of its branches. It produces fine, durable lumber, and large quantities of gum exude from it, which might probably be made available as an article of commerce. The *jenisero*, a tree of the acacia family, also reaches great proportions and produces an excellent wood, unknown to commerce, occupying a middle place between mahogany and cedar, with some of the good qualities of both. Of the *guayacan* (lignum-vitæ) there are two varieties, black and green, both abundant, and the *granadillo*, *rourón*, and *ñámbaro* (rosewood) are all beautiful and valuable cabinet woods,

which grow abundantly. The *níspero*, producing one of the best tropical fruits, also furnishes a valuable wood, rivalling mahogany in beauty for cabinet uses; it is hard and heavy, under water becomes as hard as iron, and will last well. The *madroño* produces a fine-grained wood, suitable for turning, and would be useful as a



SCENE ON CARIBBEAN COAST LANDS.

substitute for boxwood, and for wood-engraving and other purposes.

The tree called *madre de cacao* (mother of cacao), used extensively to shade the cacao plants, does not grow to a large size, but produces a wood called by the natives *madera negra* (black wood), useful for foundations, sleepers and posts, as it is almost indestructible under ground. The *guapinol* produces a fruit from which an edible substance is made, and a gum said to be equal in

every respect to copal; its wood is beautiful, and useful either for construction or cabinet purposes. In Chontales occurs the remarkable *herrania purpurea*, a chocolate tree, whose seeds are reported to yield a finer flavoured chocolate than the cacao itself. The *cortés* is a large tree producing a beautiful, fine-grained, and very hard wood of a pale yellow colour, and the *zapotillo* has a wood which, it has been claimed, will resist the attacks of the *teredo*, or boring sea worm, so destructive in the Gulf of Mexico and Caribbean Sea, but this is not the case. There are also several other trees producing woods excellent for underground use.

Oaks of several varieties,—particularly the live oak, which grows to an enormous size,—and the long-leaved pine, called by the natives *jocote*, grow abundantly in the more elevated regions. The latter is particularly rich in resinous juices, and would produce abundant harvests of turpentine and tar. Pine also occurs on the east coast rivers. Dyewoods abound in the dense tropical forests, one of the most valuable being called *moran*. Brazil wood, a variety of which is locally called *madera de Nicaragua*, is abundant, also sandal, *nance*, *elequeme*, and many others that produce valuable tinctures and dyes well known to the natives, but which have as yet no commercial nomenclature, and are unknown in the markets of the world.

The varieties of palms are numerous. The best known are the *corozo* or *cohune* palm and the *coyol*, both producing great crops of oleaginous nuts. The vegetable oils that can be produced in these forests present a wide field

for commercial enterprise, the suitable trees and plants existing in great variety and abundance. Medicinal plants of all kinds abound, some of them unknown in our pharmacopœia.

Besides cotton, mentioned elsewhere, Nicaragua has many other textile plants valuable to commerce, such as the *pita* (Bromelia pita), varieties of *yuca*, and the *Agave sislana* that produces the *henequin*, or sisal hemp of commerce, which forms such an extensive article of export from Yucatan. *Ramie* and jute could also be grown in perfection in Nicaragua.[1] The consumption of fibres in the United States is large and constantly increasing, and with such a market in close proximity, and vast facilities for production, this industry must become an important one in Nicaragua and Central America generally.

Agricultural Products.

The principal agricultural wealth of Nicaragua lies in its coffee plantations, rapidly increasing in number. In Matagalpa, especially, there is a growing colony of foreigners, and there seems to be a good opening in this region, for there are thousands of acres of land especially adapted to the cultivation of coffee. The main obstacle in the past to the progress of this most important industry

[1] Andagoya says:—"The inhabitants have a manufactory, where they make cordage of a sort of *nequen*, which is like corded flax; the cord is beautiful, and stronger than that of Spain, and their cotton canvas is excellent. Pitch and timber for ship-building do not abound more in Biscay."

has been the lack of facilities for transportation. But few of the roads are practicable for waggons or carts, necessitating the carriage on the backs of mules. The government is doing something to remove this obstacle by making an attempt to create waggon roads, and the opening of the railroad to the Pacific coast, and the increase of steam navigation on the lakes and San Juan, have been of assistance, but very much remains to be accomplished to enable Nicaragua to compete with other countries. Coffee can be shipped also by steamer to San Jorge, thence by waggons or carts to the port of San Juan del Sur. In the dry season the San Juan route is very inconvenient, as I found it, on account of the scarcity of water and obstructions in the river at certain points, and this route for the purposes of commerce is rapidly falling into disuse.



PREPARING COFFEE.

The production of india-rubber is an important industry, but yearly rapidly decreasing from the wanton destruction of the trees. Even with the most careful treatment, they will stand but a few years of tapping, and as they have

not been cultivated, at least to any extent, the export of india-rubber will soon dwindle and die out unless there is



ON A COFFEE ESTATE.

a radical change. Called in South America *caucho*, and in Central America *hule*, india-rubber is obtained from the *siphonia elastica*, a tree growing to fifty or sixty feet in

height. The collectors of rubber, called *huleros*, employ many methods to obtain it, the following being those most generally used, the first having lately been officially prohibited.

1. The trees are felled, and V-shaped channels (about two inches deep and two and a half inches wide at the top) are cut round the trunk one foot apart, from which the sap or milk flows, through funnels formed of leaves, into calabashes or holes made in the ground and lined with leaves.

2. The tree is left standing and two or three vertical channels, according to the size of the tree, are cut through the bark from top to base ; then numerous oblique channels are cut connecting with the vertical ones. To effect this, the *huleros* cut off vines and creepers and use iron spurs strapped to the knees and ankles, with a rope under their arms and encircling the tree. The milk from these channels is collected in holes, as in the first process.

3. The outer bark of the tree is scraped off with a "machete," commencing eight or ten feet above, and extending down to within one or two feet of the ground, and a ridge of clay, or a vine and clay, is so fashioned around the tree as to direct the flow of the milk into the receivers at the foot.

The *huleros* make waterproof blankets and bags—and very excellent they are—which they prefer to any imported articles, as they do not become so heated when exposed to the sun, and are less liable to crack or scale off. The process is to stretch the cloth on the ground, pour the

milk over it, and distribute it very evenly by paddles or cocoa-nut husks ; a short exposure serves to dry it.

Till lately the government has most unwisely exercised practically no supervision of the forests. It has, however, endeavoured to stimulate cultivation by issuing a decree offering—but not giving, it is said—a premium of ten cents for every tree planted where the number is not below 250



MULE TRACK IN THE LOW COUNTRY.

planted by one person ; the trees to be planted in squares of not less than 6 *varas* (about 16 feet) for each plant. In the lower regions of Nicaragua, toward the Caribbean coast, there are large tracts of land suitable for growing rubber trees, and their cultivation would prove very profitable to any one who could afford to wait for a return from the capital invested until the trees reach maturity, which is from seven to ten years.

The cultivation of bananas for export has hitherto been largely confined to a strip on the Caribbean coast, with the principal outlet at Bluefields; but, with improved communication to the interior, this fruit will become a more prominent feature in the exports from Nicaragua. Large areas of fertile but now unoccupied lands will be put under cultivation; but it would not be prudent to make too much of this, as large tracts suitable for this industry are to be found from Florida far southwards. The lands generally used are the rich alluvial deposits of the valleys and river bottoms, but there are many upland regions, where rain is abundant, or water plentifully supplied by other means, which will produce abundant crops and finer fruit (being harder and less liable to damage from a sea voyage). The difficulties of transport, however, preclude any considerable development in this direction.

There is perhaps no industry in Central America more attractive to men of small capital than banana-growing; the clearing of the land is effected cheaply, the cost of after cultivation limited only to a clearance of weeds and undergrowth sufficient to allow access to the trees, is slight, and the time necessary to produce a paying crop is short. The profits are said to be considerable, and I have read very glowing accounts of what can be done. These, however, have to be taken with great reserve. The fruit-growing experiences in California and Florida certainly do not encourage the view that banana cultivation is an industry which can be embarked on without special qualifications.

There is one variety of the banana family, the plantain,



LOADING BANANAS.

the production of which need only be limited by the demand. In Nicaragua it is boiled, stewed, baked, roasted in the ashes, fried, dried and ground into flour, cooked in or out of the skin, green or ripe, and is said to produce more nutriment per acre than wheat, corn, or potatoes. I have seen it stated that when the northern



BRINGING BANANAS TO MARKET.

countries learn its use, it will become as usual an article of food as the potato; but this is certainly an exaggerated view to take.

The cacao (*theobroma cacao*) grown in Nicaragua has a high reputation, but little, if any, is shipped to the general markets. Val-Ménier, the well-known French firm, has an estate between Rivas and Granada, near

Nandaimé, whose product is sold in Nicaragua, it being too expensive to serve for the manufacture of common chocolates.

The cacao tree, producing two crops a year, seldom exceeds 20 feet in height, the leaves being large, oblong, and pointed, and the nuts contained in long, oval-pointed pods. The trees are planted about 15 feet apart. When young, the plants are delicate, requiring to be sheltered from the sun in the manner common in coffee plantations, and plantains or bananas are first used for that purpose, but quick-growing trees, such as that called by the natives *madre de cacao,* are planted with them; and, as they reach sufficient size, the plantains are cut down, leaving the trees as a permanent shade. The cacao begins to bear in about seven years, and continues to produce for thirty to fifty years. Large capital is therefore necessary to start a plantation, but when once established and in full bearing little outlay is necessary, and, so far, the revenue has been large, sure, and steady. Great competition will occur before long, however, as cultivation is being undertaken in other parts of the world.

Sugar-cane grows with extraordinary luxuriance. A great deal of the sugar manufactured is of a coarse brown quality, the juice being merely boiled until it crystallizes, without being cleared of the molasses, and in this crude state is poured into moulds forming small cakes, which are sold to the poorer classes. A very large quantity of the cane is used in the manufacture of a species of rum called *aguardiente* (known also as "cusuza" and "blanco"), a most terrible compound, but

perhaps no worse than the villainous Hamburg spirits found everywhere.[1] The sale of spirits being a government monopoly, distillation can only be carried on by licence, and is principally confined to the larger producers. The bulk of the sugar produced comes from the district



NATIVE "CHOZAS" IN THE HOT COUNTRY.

of Jinotepe, where very primitive and imperfect methods are employed, and water is scarce. In the neighbourhood of Granada, San Rafael, and Pital, there are several

[1] Andagoya says: "They make wine from a kind of cherry, which is as strong as the wine of Spain, although the strength soon passes away. In all the countries I have mentioned the whole happiness of the people consists in drinking the wine they make from maize, which is like beer, and on this they get as drunk as if it was the wine of Spain, and all the festivals they hold are for the purpose of drinking."

plantations under English management. A company has started the working of a large plantation in Chinandega, at San Antonio, with a first-class plant, and modern improvements as regards cultivation. Another company has taken over the Polvon plantation in the same department. In the department of Leon there are two plantations, the Polvoncito and San Pedro.

The production of sugar is not enough for even local wants, for Nicaragua imports from San Salvador.

Cotton of the finest quality is indigenous to Nicaragua.



CARTING FIREWOOD.

When Columbus discovered the country, he found the natives dressed in garments of cotton cloth, and the Indians of the present day manufacture from it hammocks, sail cloth, and coarse material for clothing. The quantity raised is entirely for home consumption, as Nicaragua can never compete, for export purposes, against the United States.

Corn (maize), of which three crops can be raised from the same ground annually, flourishes luxuriantly. The tobacco used in Nicaragua, raised in the country, is of good quality, and could be cultivated to any desired extent, as there are large tracts of land well adapted to its use. The cigars are wretched, the preparation of the



SCENE ON THE OUTSKIRTS OF VILLAGE IN THE COAST LANDS.

leaf not being understood, or at any rate attempted. Rice, extensively used, is abundant; the climate and soil being suited to its cultivation. Indigo and cochineal were formerly produced in large quantities, but, superseded by the introduction of mineral dyes, the cultivation, particularly of the latter, has almost entirely ceased. The



POTTERY MARKET.

yuca, the yam (*ñame*), and the sweet potato are the principal farinaceous roots extensively cultivated. The potato also thrives well, and produces large crops in the more elevated regions, yet imported potatoes are used everywhere in the towns.

The bread-fruit grows to perfection in Nicaragua, yet the natives are said not to appreciate its full value. The cocoa-nut palm is abundant, and on the Caribbean coast

its fruit is an important article of commerce; no efforts have been made to utilize the fibre of the husk, which in the East Indies has added so largely to the profits derived from cocoa-nut groves. *Frijoles,* the brown beans forming such a prominent article of diet throughout Spanish America, are produced abundantly, while other



SCENE IN THE TIERRA CALIENTE.

edibles and fruits of the tropics yield ample crops, such as oranges, lemons, limes, citrons, shaddocks, pine-apples, mameys, chirimoyas, guavas, mangoes, and aguacates (alligator pears). The vegetables of the temperate zone grow well in the more elevated districts, where cabbages, turnips, radishes, lettuce, egg plants, and tomatoes can be raised with slight labour and care.

Cattle-Raising.

Cattle-raising on the savannas—extensive plains of grass, affording pasturage in the rainy season, and with few shrubs growing on them—of the central and northern provinces is one of the great sources of wealth, the production of horned cattle being large enough to supply all the necessities of home consumption, and to allow a considerable exportation, principally to San Salvador, where cattle are scarce. Large *haciendas*, owned by the richest and most influential people of the country, are entirely devoted to this industry. Dairy farms have been established in the neighbourhood of the principal cities and towns and are doing well.

Fauna.

The fauna is like that of the other Central American states. The jaguar, puma, and ocelot still infest the more wooded districts, alligators are found in the lakes and swarm in the San Juan and other rivers, while the vulture, buzzard, toucans, humming-birds, and howling monkeys are common. The species of reptiles cover a wide range.

Commerce.

The imports amount to about £500,000, being the value of manufactured goods brought from the European and American markets. The principal articles exported

are coffee, rubber, woods, hides, gums, indigo, sugar, cocoa, and bananas, to the value of £470,000.

The rates by the steamer route on the river San Juan are high, though less than *viâ* the Pacific, but this is more than counterbalanced by the uncertainty and delay on this line. The lines from Europe and the United States are good, and the rates generally low.[1] The canal will bring about a great change, and when that work is completed, Granada, and other towns close by, will be virtually seaports, and ocean steamers will be able to load and discharge their cargoes at their wharves. The lake will be the centre and point of distribution of trade for the whole country.

[1] To Bluefields. *From New Orleans*, Southern Pacific Company's steamers, from December to March every twenty days, remainder of the year ever ten days.

To Cape Gracias á Dios. *From New York*, Honduras and Central American Steamship Company, every three weeks.

To Corinto. *From San Francisco and from Panama*, Pacific Mail Steamship Company, thrice per month.

To Greytown. *From Southampton*, Royal Mail Steam Packet Company to Colon, thence by Royal Mail or other local cargo steamers.

From New York, Honduras and Central American Steamship Company, every three weeks; Pacific Mail Steamship Company to Colon, thence by Royal Mail. (Steamers leave Greytown for Granada, on Lake Nicaragua, every four days.)

To San Juan del Sur. (Same as Corinto.)

(Managua, the capital, is reached by steamer to Greytown or to Corinto, thence by rail and lake steamers.)

Chapter XII.

THE DEMAND OF THE AGE: SHIP CANALS.

A SERIES of great works, in the form of ship canals, providing rapid and inexpensive transportation, marks the latter part of the nineteenth century, and every maritime power is concerned with schemes of ocean transit. The mechanical and financial means for undertaking and executing great enterprises have greatly improved, while the volume of commerce has vastly increased, and works impossible thirty or forty years ago are quite feasible to-day. Money is cheaper by a half than it was twenty years ago, while engineering appliances have so improved, that the cost, not only in labour but in time, has been lessened in a like proportion.

Commerce has advanced with colossal strides. The business done by the world's shipping and railways is immense, and increases at a rate greatly exceeding the growth either of population or of industries. More than half the shipping of the whole world is owned by Great Britain, while one-half the railways have either been built directly, or with money supplied, by this

country. The English are the carriers of the world by land and sea.

Fifty years ago we had only one-third of the ocean-carrying trade, while to-day we have more than one-half. The carrying power of nations is more than three times what it was in 1860, and in the last twenty-two years, by sea, it has doubled, while by railways it has trebled.[1]

There are three classes of ship canals.

1. Those which traverse high districts, surmounting the elevation by locks supplied from natural lakes or artificial reservoirs, such as the Languedoc in France, and the Caledonian in Scotland, or, in a lesser degree, the Manchester Ship Canal.

2. Canals in low-lying districts, on a uniform water-level from end to end, defended against the inroad of the sea at high water by double-acting locks, which also retain the canal water at low tide, of which the canals of Holland and other low countries are examples.

[1] Summing together the traffic by land and sea we find that it has grown tenfold since 1850. The carrying trade is at present one of the chief occupations of men, as we see by the numbers employed on railways and in sea-going shipping, viz. :

	Railways.	Shipping.	Total.
Europe	1,540,000	550,000	2,090,000
United States	874,000	60,000	934,000
Other Countries	480,000	95,000	575,000
The World	2,894,000	705,000	3,599,000

The gross receipts of the carrying trade in which the above men are employed amount to about 650 millions sterling per annum, which is equal to £180 per man, or nearly £2,000,000 per day.—MULHALL, *Contemporary Review*, August, 1895.

3. Canals, such as Suez, practically open cuts at sea-level, without locks, and communicating freely at either end with the sea, from which they derive their water-supply.

The completion of the Suez Canal gave an enormous impetus to this class of engineering works, and its magnificent yearly dividends have popularized them. But of late years several similar enterprises, in various ways, have somewhat discredited ventures of this kind. First came the painful episode of Panama, which has exercised since 1889, though yearly in a lessening degree, a depressing influence; the slow development of the Corinth Canal doubtless had its effect, and the experience of Manchester would seem to inculcate another lesson of caution.

Public interest in ship canals has been aroused again, however, by the successful opening of the Baltic Canal, which doubtless will stimulate the Nicaragua project, as well as other proposed kindred undertakings.

There are certainly not wanting a considerable body of sceptics and objectors to the Nicaraguan Canal, as there have always been to any such new enterprise, or indeed, to any great change destined to develop into one of the chief instruments of the world's progress.

The danger and impracticability of such changes was loudly proclaimed when it was proposed in 1816 to cross the Atlantic in a small steam-vessel called the "Savannah." In 1836, when Morse asked Congress for the means to construct a telegraph line between Baltimore and Washington, the whole world ridiculed the idea, and pronounced it visionary and impossible. Before Eads was allowed to

begin his great work of controlling the waters of the Mississippi, he had to combat for years the fiercest opposition. Lesseps, ere he could carry through his Suez Canal, had to fight a campaign for many years to overcome the prejudices of the world, especially of this country, where his project was originally treated with the greatest disdain, at least in political and engineering circles.

These and others have had to contend with every species of indifference, prejudice and ignorance, apart from the ever active hostility of vested interests.

But when one thinks of what has been accomplished within the closing years of the nineteenth century, how the face of the world has been covered with innumerable monuments of engineering science and skill, it is surely not too much to believe that the time has come for the execution of this work, for which the world has waited nearly four centuries.

In railways we have deserts crossed, chasms spanned, marshes traversed on stilts, and mountain ranges tunnelled or scaled above cloud-level through regions of perpetual ice and snow. One of these, the Siberian railway, is being carried out, silently and unobtrusively, across the most dreary, frozen, and inhospitable region of the world, and will extend nearly one-fourth of the whole way round the globe.

In the Suez, the Amsterdam, the Pontiloff, the Manchester, the Corinth, and the Baltic Canals, we have colossal works already executed, while in the Panama, Nicaragua, Cape Cod, and Midi Canals we have projected works of

vast importance. All discussed for long periods, some for centuries, it is only within the last three decades that the Suez passage was made, while several of the completed works date no further back than a year or two ago.

Other works, such as the Eiffel Tower, the Brooklyn, the Forth, and the Tower Bridges, are all monuments of which this century has reason to be proud.

The first canals[1] were primarily intended for irrigation, transportation being an after-thought, and for a long period incidental or of secondary consideration. The Great Canal of China was built more than 900 years ago, and is yet the main artery of communication in that country. In Spain the Moors constructed canals for the purpose of connecting inland places with rivers, and Cadiz with Granada. It was, however, not until some time after the decline of the Roman Empire that canals for navigation purposes commenced to attract attention.

Previous to the introduction of locks and sluices they were limited to territories comparatively level, and as far back as the twelfth century large canals had been cut in Flanders, while in 1560 the great canal connecting Brussels with the Scheldt was finished. Locks and sluices came into practical application on the Briare canal first, and, later, on the Canal du Midi, towards the end of the seventeenth century. Other countries followed the lead, and the period of canal construction and development continued until the beginning of the nineteenth

[1] See paper on "Great Canals," by Mr. A. G. Menocal.

century. England was one of the last nations to enter the race. Considerable progress had been made in the meantime in improving the navigation of rivers and streams, but the time of activity in canal construction extended between 1720 and 1830. The increased facilities of transport gave a remarkable stimulus to commercial and industrial progress. Raw materials were transported at about one-tenth of the previous cost, thus facilitating the interchange of commodities between different parts of the country to an extent unknown before. The great industrial development and prosperity of England dates from the period of the construction of water-ways.

In the United States the question of building canals to connect the Great Lakes with the ocean, and with the magnificent navigable rivers penetrating thousands of miles into the interior, was agitated early in the history of that country. Washington was one of the first to attempt the improvement of transportation facilities by canals, especially by one connecting Chesapeake Bay and the Ohio River, and with that object made extensive surveys and explorations in 1754. Soon after the War of Independence he obtained a charter for the construction of a water-way between the Hudson River and the Great Lakes, and was elected President of the company organized for its construction.

Other companies were subsequently formed, and several small canals were constructed. The question of a direct route from the Hudson to Lake Erie continued to be discussed, and in 1825 there was completed the Erie

Canal, a great achievement of hydraulic engineering at the time.[1]

The opening of the Erie Canal was quickly followed by similar undertakings, and at one time there were over 5,000 miles of canal in operation in the United States, built at a cost of £34,000,000 ($170,000,000). The growth of traffic on these water-ways was steadily on the increase for a number of years until 1857. From that date the railroads have been constantly in the ascendant to the detriment of canals, of which not less than 2,000 miles have been abandoned, while the railroad mileage has increased to enormous proportions.

The history of the struggle between internal canals of small dimensions and railroads has been similar in all countries. The fight raged bitterly for a number of years; but the result has been the same in every case—the unconditional surrender of the canals to the railroads. This, however, was not so much the fault of the system as of their management. The railroads have, it is true, great natural advantages over canals. They are better able to abridge distances by reason of superior speed, possess greater facilities for overcoming elevations and spanning streams, free from danger of destructive floods. But their great success is mainly due to the fact that they have kept pace with the progress of the world.

Water-ways built between the beginning of the eighteenth century and the first quarter of the nineteenth century were regarded at the time as ample for the

[1] It is 365 miles long, rises to an elevation of 656 feet, by means of 72 locks, and cost £10,320,000 ($51,600,000).

requirements of trade. In a few instances there was progressive improvement in their dimensions and appurtenances, but, while the industrial, agricultural, and commercial development of the world has advanced to proportions not dreamt of a century ago, canals generally have remained stationary and are now obsolete. The canals of the future must have dimensions and facilities for rapid transport adapted to the new conditions of commerce. In other words, they must no longer be barge or boat canals, but ample water-ways for the free passage of the ships now engaged in carrying the world's ocean trade. Of such canals we have now several important examples in successful operation, some in process of construction or near completion, and others again still in the stage of projection.

As the recent opening of the Baltic Canal has drawn public attention to that work, it is unnecessary to give any lengthy description of it.

This canal attracted very little notice until the time for its completion drew near, for the reason that it was the work of a government which acts quietly and unostentatiously, and was free from all financial complications, advertisement, and stock manipulations. Far less important than the Suez Canal as a commercial enterprise, it is interesting as an engineering work, as well as on account of its strategic qualities, and the general benefits it will confer. The inception of the work in one form or another dates back several centuries. Connecting, as it does, the Baltic and the North Sea, it will greatly strengthen the offensive and defensive power of Ger-

many, and at the same time enable the merchantmen of the world to avoid the long and dangerous passage by the Cattegat, and round the north of Denmark.[1]

The Isthmus of Corinth separated the Adriatic and the Archipelago, compelling all vessels bound from one sea to the other to round Cape Matapan, thus materially lengthening the voyage from the Western parts of Europe to the Levant, Syria, Asia Minor, and Smyrna, and increasing the distance from Europe to the Black Sea. The proposal to pierce this isthmus by a water passage originated several centuries before our era, and work was actually commenced before the reign of Nero, practically upon the route adopted for the canal recently completed. It is estimated that the Corinth canal[2] will effect a saving in time of two days in the voyage from the Adriatic to the Ægean Sea, and the probable traffic has been calculated at about 4,500,000 tons, a very optimist view of the value of the canal.

The undertaking had a chequered career, and it is

[1] The canal begins at the dockyard of Kiel in the Baltic, and enters the Elbe near Brunsbüttel, 15 miles above the North Sea. It has a total length of 64 miles. Its width at the water surface is 197 feet, and at the bottom 72 feet; the mean depth being 28 feet. The canal is a continuous cutting at the level of the Baltic, flood-gates being provided where it enters the Eider, at Kiel, and at the outlet in the Elbe. The largest ships of the German navy will be able to pass through the canal, and it is estimated that of the 35,000 ships that annually pass through the sound, not less than 18,000 will use the water-way.

[2] The canal, an open water-way at sea-level, 4 miles in length, has a uniform bottom width of about 81 feet, and a depth of 24 feet. No passing places, as in the Suez Canal, were regarded as necessary. The ridge pierced is 180 feet maximum height.

worthy of remark that General Türr, the *entrepreneur*, was the brother-in-law of, and otherwise connected with, M. N. B. Wyse, the concessionaire of the Panama Canal, who parted with his rights to Lesseps. A concession for the construction was granted in 1870; but the work was not actually commenced until 1882. It was to be completed in 1888, but unforeseen delays, due to financial difficulties, compelled the company to obtain extensions of time, and the canal was not opened to traffic until 1893. Whether it will eventually be a financial success is doubtful.

A feature of the work is the almost perpendicular sides of the cutting, in which a slip recently occurred, giving the canal a bad reputation.

The North Sea Canal[1] was built for the purpose of facilitating the navigation of the Zuyder Zee, in which vessels were frequently detained many days, or compelled to unload a part of their cargoes on account of numerous shallows and banks. At the time of its completion it was regarded as the greatest work of its kind in the world, but it has been superseded by a much larger water-way, the Amsterdam Ship Canal.

This great work[2] was carried out for the purpose of

[1] It has a bottom width of 31½ feet, and a depth of 18 feet, was begun in 1819, and finished in 1825. The length is about 50½ miles, and the width at the surface, 124 feet.

[2] The canal is 197 feet wide at the water surface, 88 feet at the bottom, and has a minimum depth of 23 feet. Eastward and below the city of Amsterdam, the Zuyder Zee is shut out by an enormous dyke in which are three locks for access to and from the canal and Zuyder Zee. The construction of these works upon a lake of mud, requiring 10,000 piles in their foundation, was a remarkable achievement. The

improving the access to the commercial city of Amsterdam. It extends westerly to the North Sea, reducing the distance to 15½ miles, instead of the 50½ miles by the North Sea Canal, and enabling much larger vessels than formerly to enter that port.

The Manchester Ship Canal[1] is one of the most important undertakings of the present time, not only by reason of the engineering difficulties overcome, or of the cost incurred, but because, unlike all other ship canals built, or in process of construction—except the Pontiloff—it has changed a large inland centre of population and industry to a seaport. Whether the canal will be a financial success to the shareholders is doubtful, but it will certainly confer considerable benefit on Manchester and other towns in the vicinity. It is a question, however, whether it has not come rather too late, for the cotton industry in Lancashire is most seriously threatened

locks at the ends of the canal are for the purpose of *locking down*, as the surface of the canal has to be kept twenty inches below low water, and to maintain this uniform level pumping has to be employed. The canal took ten years to complete.

[1] The canal is a continuous cutting about 35½ miles long. It begins at Eastham on the south bank of the estuary of the Mersey, which it follows for a distance of 13½ miles, confined by embankments and retaining walls until it reaches Runcorn, where it leaves the waters of the Mersey and by an almost direct and independent course reaches its terminus in the large docks built at Salford and Manchester. The docks at Manchester are about 65 feet above sea-level, the elevation being overcome by five locks with an average lift of 13 feet each. The canal has a bottom width of 120 feet, and a depth of 26 feet, the width of the water surface varying with the nature of the ground. The locks are worked by hydraulic power, and are of sufficient size to admit the largest merchant steamers afloat.

from the Far East and the Near West. Had it come sooner, this great centre of industrial operation and activity, freed from the onerous port dues levied at Liverpool, and from excessive railway rates, would doubtless have felt the full advantages to be gained from such a water-way.

The works were commenced in 1886 and the canal was officially opened on May 21st, 1894, by Queen Victoria and the Prince of Wales, in the presence of two million people, amid the greatest enthusiasm. The total cost of the canal, including the docks at Manchester, has been about £15,000,000, much of which was expended in protracted litigation and compensation claims.

The results of the Manchester Ship Canal appear to have checked the progress of several works of importance in this country, such as the Sheffield canal scheme to open up a way to Goole, and the proposed canalization of the Avon from Bristol to the Channel; and, although the improvements in the Severn in the direction of Worcester are proceeding, the suggested modernization of the canal to Birmingham, in order to make it available for large vessels, is at present in abeyance.

The Caledonian Canal, which cost about a million sterling, is a magnificent monument of Telford's skill. In many of its features it presents a close parallel to the Nicaragua Canal. Great difficulties were overcome by him, utilizing as he did Highland lakes, and surmounting the summit level of the glen, between the Beauly at Inverness and Loch Eil at the mouth of the river Lochy. The length is about sixty miles, and saves some

400 miles of coasting for ships by the north of Scotland through the stormy Pentland Firth. The summit level is at Laggan, between Loch Oich and Loch Lochy, whence the drainage flows to the eastern and western seas. About thirty-seven miles are natural lake navigation, the remaining twenty-three being artificial.

The Sault Sainte Marie Canal, connecting the waters of Lake Superior and Lake Huron, is the most remarkable lock water-way in the world. The fall of the Sainte Marie River at the *Sault* (the rapids, in French Canadian) is about 18 feet. In 1855 a canal with two locks (each 350 feet long, 70 feet wide, and about 9 feet lift) was built to overcome the difference of level. These locks could not accommodate vessels drawing more than 11 feet of water, and their maximum capacity was soon reached by the enormously increasing traffic. The question of enlarging the canal and locks to admit the passage of larger vessels demanded speedy solution, and resulted in the canal being transferred by the State of Michigan to the Government of the United States as a work of national importance.

The water-way was increased in depth to 18 feet, and a new lock (515 feet long and 80 feet wide in the chamber, with a lift of 18 feet) was constructed, which is regarded by engineers as one of the finest examples of hydraulic engineering in existence. Steamers of over 3,000 tons capacity can pass through the lock in less than twenty minutes. In 1892 the traffic passing through the single lock, during seven months, exceeded 10,000,000 tons of freight, or at the rate of over 17,000,000 tons a year, which

was about double the traffic passing through the Suez Canal in the same year, and yet the maximum capacity had not been reached. The increasing traffic now threatens to exceed its capacity, and the construction is in hand of a new lock which will be 800 feet long, 100 feet wide in the chamber, with 21 feet depth of water on the sills, thus greatly exceeding the present one.

The main bearings of the canal upon the Nicaragua project are that it is the only ship canal with lockage facilities upon a scale at all comparable with that proposed for Nicaragua, and like that work has an inexhaustible reservoir on its upper level, while the deepening of natural water-courses, to furnish a continuous and capacious channel, was also necessary.

The "Canal maritime du Midi," or the "Canal des deux mers" as it is sometimes called, designed to connect the Bay of Biscay with the Mediterranean, has received little attention in this country. The general idea seems to be to follow a route beginning at Bordeaux and ending at Cette, a length of some 200 miles, utilizing the present Languedoc Canal and the waters of the Garonne and Aude. It would greatly reduce the distance from the English Channel to the Suez Canal, and avoid the present ocean route around the Bay of Biscay and the coast of Spain.

The project, generally considered impracticable in this country, has been growing in favour in France and has lately been vigorously pressed upon the French Government. A third commission was recently appointed to examine the scheme and report upon it, the two previous ones (in 1880 and 1884) having adversely viewed the

project. It is said that the French feeling on this subject is fully expressed in the saying, *Assez de canaux*, which became a fixed idea in the French mind after the miserable collapse of Panama, that swallowed up so many millions and destroyed so many reputations. It is easy, however, to comprehend that with the French people, who always love a great idea, the project must exercise very considerable fascination. Apart altogether from commercial considerations, it offers transparent advantages to France as a naval power, enabling her, as it would, to unite her squadrons in the northern Atlantic and Mediterranean without passing Gibraltar. A serious blow at British supremacy on the sea would be dealt by this canal, not only in the universal opinion of Frenchmen but also in the judgment of many Englishmen.

The Languedoc Canal, finished in 1681,[1] was planned and constructed by Riquet under the patronage of Colbert, one of the greatest among the statesmen of France, who established the French marine. He founded a colonial system, and to encourage trade with the Levant, Senegal, Guinea, and elsewhere, privileges were granted to companies, but these were unsuccessful, the chief cause of their failure, as of French colonial systems at the present day, being the narrowness and rigidity of the government regulations, the harassing control, and the constant change of officials. The canal, considering the time it

[1] It is 148 miles long and has a summit level 600 feet above sea, upwards of 100 locks and 50 aqueducts, a lasting monument to the skill and enterprise of Riquet; and this a hundred years before Brindley began his work on the Bridgewater Canal.

was carried out, was a great achievement. The story of Riquet is one of the most striking in the annals of engineering.[1]

[1] Pierre-Paul de Riquet, baron of Bonrepos, creator of the Languedoc Canal, born in Béziers in 1604, died at Toulouse Oct. 1st, 1680. He was descended from the Arrighetti or Riquetti, Gibelin proscripts driven from Florence, the same family one branch of which gave birth to Mirabeau. The idea of opening communication from the Mediterranean to the Ocean was not absolutely new, for the Romans had thought of it. Under Francis I. the plans and estimates were made (1539), but that was all. The question was raised under Charles IX. Henry IV. ordered Cardinal de Joyeuse to take the matter up, and in 1598 Pierre Reneau, creator of the Craponne canal, presented a project which was not approved. Richelieu had studies made (1632), and until 1650 one plan succeeded another, but without result. The glory of executing this vast enterprise was reserved for Riquet. Farmer of taxes in Languedoc, he found himself admirably situated to study the water system of that region. In executing his levels in the section under his charge, he was led to make attempts at canalization on a restricted scale; eighteen years thus passed served to prepare him for more important studies and vaster projects. Finally, in 1662, he submitted three projects to Colbert, who entered with ardour into his views, and induced Louis XIV. to share his enthusiasm. However, it was not till 1666 that the difficulties were overcome, and that the edict authorizing Riquet to commence his great work appeared. The king authorized the contractor to take all the land required for construction, and placed it in fief. The insufficiency of funds obliged Riquet to sacrifice his private fortune on this work, which took fourteen years of unheard-of labour. The number of labourers amounted at times to 10,000, and the first cost of construction was estimated at seventeen million francs (thirty-four million francs at present value). Riquet did not live to see the completion of his scheme. Broken down by work, and by the heroic efforts he had made to conquer so many obstacles, he died six months before the opening of the canal. He had sunk three millions of francs in the enterprise, and left two millions of debt to his heirs, who had to expend all their means till 1724, when they commenced to receive some return for so many sacrifices.—*Vide* LAROUSSE, *Dict. Universelle*, vol. xiii.

There seems to be no abnormal difficulty in the way of constructing this canal. From Bordeaux to Toulouse, about two-thirds the distance from sea to sea, is the Garonne, one of the finest rivers of France, and along its valley, and parallel with the stream, will run the canal. At a point a few miles east of Toulouse, nearly the highest level of the canal, begins a tributary of the Aude, and some twenty miles further on the valley of the Aude itself is reached, and its course followed almost to the Mediterranean. The water supply will be ample, and obtainable at any elevation, for the head waters of these and numerous other streams are far above the canal level. The maximum height to be overcome will be under 700 feet.

Although the length of the canal, 200 miles, is considerable, on more than one-half this distance it will only be necessary to widen and deepen the present channel, which can be rapidly and cheaply done. There will be no expensive blasting operations. Nor will there be a costly amount of bridging, as the canal will traverse few roads and lines of railway. One reason which will weigh greatly in France is that the canal will be entirely a national enterprise. It will be made on French soil, by French engineers, with French labour and material. It can never pass out of the nation's hands as Suez has almost done. Of advantage to the world of commerce generally, it will be of supreme importance to France.

The future of this project depends on the capricious course of French politics. Meanwhile one-third of the deputies and senators have promised their support,

and, whatever the issue, the question is certain to come prominently into notice.

The Illinois drainage and ship canal is a stupendous work, the cost of which has devolved upon the people of Chicago and its suburbs. This project was undertaken not solely as a drainage channel for sanitary purposes, but in the belief that it would become a great ship canal. It was hoped that the United States would aid in improving the Illinois and Mississippi rivers, in order to open a continuous steamer passage from the Lakes to the Gulf of Mexico.

With the improvements now in progress, it is anticipated that boats of a draft of 14 feet will be able to reach the Gulf for over seven months of each year, a period longer than lake navigation is open *viâ* the Straits of Mackinaw, and that the route will be closed by ice for an average of seventy days only. Since 1887 the route would have been open throughout the winter for five years out of six.

The cost of the construction of the first forty miles to the head waters of the Illinois and the Desplaines rivers, will be about £6,000,000 ($30,000,000). There is as yet no definite estimate as to the cost of the work (principally dredging) from that point to the mouth of the Illinois river, which will be necessary to render it a navigable stream. The cost of these forty miles, however, it is believed, will probably be greater than the remaining portion.

The canal involves 90 per cent. of the rock and 67 per cent. of the earth excavation needed at Nicaragua, it is

said, while other work which is to follow will raise the quantities to about the same for both rock and earth. When a 16 feet depth has been carried through to the Mississippi, the quantities will stand approximately the same for rock and double as to earth, with bridge, dock, and property items in excess of Nicaragua, and lockage problems and dams very nearly two-thirds.

It will be seen, therefore, that the amount of work on the Nicaragua Canal does not greatly exceed what is being undertaken in the State of Illinois, and this on a work of which more than half the cost is to be defrayed by the local government of Chicago, or, to be perfectly accurate, by that of the drainage district.

The Pontiloff Canal, constructed by the Russian Government, connects Cronstadt with St. Petersburg, and has converted the inland capital of Russia into a seaport. It is three miles longer than the Manchester Ship Canal, has a uniform depth of 22 feet, and a maximum width of 275 feet. The cost, impossible to ascertain with any accuracy, is stated to have been over one and a quarter million sterling. The canal is free of tolls, it must be noted.

Many schemes are projected, of which three may be alluded to. Within the present year some discussion has arisen upon a scheme, understood to have originated with two French engineers, to cut a ship canal from Riga, on the Baltic, to Cherson, on the Black Sea. It is estimated to cost £20,000,000 sterling, and to take five years to complete. The length is 1,000 miles, the proposed depth being 27 feet, and the width 213 feet at top

and 114 feet at bottom. Following the courses of the Dwina, Beresina, and Dnieper, most of the work would be dredging, the only excavation needed being between the two former rivers, while there would be no locks. It is also suggested to do for Berlin what the Pontiloff Canal has done for St. Petersburg, and the Manchester Canal for Manchester, to make it a seaport. The dimensions of the canal are 190 feet surface and 70 feet bottom width, with a depth of 25 feet; the cost is calculated at £10,000,000. While I write news comes of the commencement of the Brussels ship canal, a most important work, which will make the present water-way navigable for ships of 2,000 tons. There will be three locks, and the cost will be 35,000,000 francs.

Chapter XIII.

VALUE OF CANAL AND LAKE.

ON the waters of Lake Nicaragua—the largest body of fresh water between Lake Michigan in North America and Lake Titicaca in Peru—could float the combined navies of the whole world, and a glance at any general map will suffice to show why such vast importance has been attached to it in the past by such men as David, Nelson, Humboldt, and Napoleon III., and by the leading American statesmen and naval authorities of the present day. In view of the importance of the subject, the opinions of some of these, comprising a range of distinguished men, of various nationalities and of widely different types of character and training, are passed in review.

After his expedition of 1665, which revealed the value of the lake and route to the British, David, who, for a buccaneer, was a singularly far-sighted man, is reported to have said that "he valued the treasure captured in Granada no more than a barrel of wine in comparison to the knowledge he had obtained of the lakes and the country between the two oceans," and he intended to return and occupy the island of Ometepe, in Lake

Nicaragua, "to open the communication between the northern and southern seas, and control it therefrom."

More than a hundred years later, in 1780, Dalling attempted to carry out the project he had formed to obtain mastery of the lakes and the river San Juan, and thus to control the chief line of communication between the two oceans. "Here a canal between them could be most easily formed," he thought, and "this work would be more important in its consequences," he was firmly persuaded, "than any which had ever yet been effected by human power." And Nelson, our great countryman, realized its importance when, in helping to put into execution Dalling's plan in the above year, he conveyed a force of 2,000 men to San Juan de Nicaragua, to effect the conquest of the country. "In order," he wrote to the Admiralty, "to give facility to the great object of Government, I intend to possess the great lake of Nicaragua, which I regard as the inland Gibraltar of Spanish America."

The life-long interest of Humboldt in the question of inter-oceanic communication finds ample mention elsewhere. One fact, however, deserves to be emphasized. On account of the insufficiency of data—on which fact he so frequently comments—throughout his whole life he prudently preserved an open mind as to the choice of any particular route, though he had a preference for Cupica and Nicaragua. "It appears somewhat probable," he says in his "Personal Narrative of Travels,"[1] "that the province of Nicaragua will be fixed upon for

[1] "Personal Narrative of Travels to the Equatorial Regions of the New Continent," 1826, vol. vi., p. 281.

the great work of the junction of the two oceans," and thirty years later, shortly before his death: "Ma prédilection pour Cupica ne m'a pas rendu indifférent aux avantages que fournit la belle contrée du Nicaragua." [1]

Deeply interested and largely influenced by the opinions of Humboldt, the great Goethe saw clearly the immense advantages to be gained by the command of such an inter-oceanic water-way. "But I should wonder if the United States were to let such an opportunity escape of getting such a work into their own hands," he said, and, after vividly foretelling the marvellous growth of the Pacific States, and indicating the intercourse likely to spring up between the Far East and the United States: "in such a case it would not only be desirable, but almost necessary, that a more rapid communication should be maintained between the Eastern and Western shores of North America, both by merchant ships and men-of-war, than has hitherto been possible with the tedious, disagreeable, and expensive voyage round Cape Horn. I therefore repeat that it is absolutely indispensable for the United States to effect a passage from the Mexican Gulf to the Pacific Ocean, and I am certain that they will do it." [2]

As already mentioned, Napoleon III. was nearly anticipating by some thirty years the attempt of Lesseps to undertake the task of opening communication across the isthmus. After expounding his views on the general

[1] "À travers l'Amérique Centrale," Felix Belly, 1867, vol. ii., p. 5.

[2] "Conversations of Goethe with Eckermann and Soret." February 21st, 1827.

question of commercial ocean highways and the distribution of the world's sea-borne trade,[1] "the dreamer of Ham" wrote in 1846 on the subject of the Canal of Nicaragua, "If the tongue of land which separates its two lakes from the Pacific Ocean were cut through, she (the State of Nicaragua) would command by her central position the entire coast of North and South America. Masaya is situated between two extensive natural harbours,[2] capable of giving shelter to the largest fleets, safe from attack. The State of Nicaragua can become . . . the necessary route for the great commerce of the world, for it is for the United States the shortest road to China and the East Indies, and for England and the rest of Europe to New Holland, Polynesia, and the whole of the Western Coast of America."

Every president of the United States, since and including Mr. Monroe, has favoured the construction of an inter-oceanic canal from the Atlantic to the Pacific across the Isthmus, and since 1879 *viâ* Nicaragua, to be practically under the control of the United States, though open to the commerce of the whole world. The interest in the subject was greatly stimulated by the commencement of operations on the Panama Canal, and very naturally so, for the idea was removed from the field of academical discussion and assumed a practical aspect. The policy of the United States on the general subject of Isthmian traffic began to receive a more definite form. "It is understood to have been, and to be," wrote Mr. Evarts in

[1] "The Canal of Nicaragua," N.L.B., 1846.

[2] The lakes Nicaragua and Managua.

1879, when Secretary of State, "not to undertake the construction of a ship canal on its own account,—even if the practicability of such a work at a reasonable cost were to be shown,—but to secure by treaties protection to the capital of such citizens as might be disposed to embark in the enterprise. The natural interest of the United States in any connection through the American isthmus has not only always been emphatically expressed by the Government, but it has been fully and distinctly recognized by other Governments, from the earliest period of our national existence."

Presidential utterances on the subject of the American doctrine in respect to the canal about this period followed in rapid succession. "The policy of this country is a canal under American control. The United States cannot consent to the surrender of this control to any European Powers," said President Hayes in 1880; and he continued, "If existing treaties between the United States and other nations, or if the rights of sovereignty or property of other nations stand in the way of this policy, —a contingency which is not apprehended,—suitable steps should be taken by just and liberal negotiations to promote and establish the American policy on this subject, consistently with the rights of the nations to be affected by it.

"The capital invested by corporations or citizens of other countries in such an enterprise must, in a great degree, look for protection to one or more of the great Powers of the world. No European Power can intervene for such protection without adopting measures on this

continent, which the United States would deem wholly inadmissible. If the protection of the United States is relied on, the United States must exercise such control as will enable this country to protect its national interests, and maintain the rights of those whose private capital is embarked in the work.

"An inter-oceanic canal across the American isthmus will essentially change the geographical relations between the Atlantic and Pacific coasts of the United States, and between the United States and the rest of the world. It will be the great ocean thoroughfare between our Atlantic and our Pacific shores, and virtually a part of the coast line of the United States. Our mere commercial interest in it is greater than all other countries, while its relation to our power and our prosperity as a nation, to our means of defence, our unity, peace and safety, are matters of paramount concern to the people of the United States. No other great Power would, under similar circumstances, fail to assert a rightful control over a work so closely and vitally affecting its interest and welfare."

And, soon after, General Grant issued an important pronouncement on the subject,[1] recommending "to the American people an American canal, on American soil," and pointing out that, while to the nations of Europe the benefits and advantages of the canal are great, to the American people they are incalculable. Forming a part of the coast line of the United States, it would increase the commercial facilities of the United States beyond calculation, he believed, while interfering in no way with

[1] "North American Review," February, 1881.

the interests of those lines of railway which connect the Atlantic States with the Pacific, but tending rather to stimulate and increase the activity out of which their traffic grows. "In accordance with the early and later policy of the Government," he said, "in obedience to the often-expressed will of the American people, with a due regard to our national dignity and power, with a watchful care for the safety and prosperity of our interests and industries on this continent, and with a determination to guard against even the first approach of rival Powers, whether friendly or hostile, on these shores, I commend an American canal, on American soil, to the American people, and congratulate myself on the fact that the most careful explorations have been started, and that the route standing in this attitude before the world is the one which commends itself as a judicious, economical, and prosperous work."

The value of the control of the canal route, while attracting little or no attention in this country, has been the subject of much consideration and discussion in the States, where it is generally maintained that the command of such an inter-oceanic highway would double the power of the States for offence and defence, on the ground that every one of its ships and guns would be as effective as two of the enemy's. "The nation that controls this canal, under terms of amity with Nicaragua, will here find rest and refreshment for its fleets," says an able officer of the United States Navy, Captain H. C. Taylor. "Hence may issue squadrons in the height of vigour and discipline, striking rapid and effective

blows in both oceans, and returning to refit in this sheltered stronghold, and to draw from it nourishment and fresh strength for a renewal of hostilities," and similar opinions might be quoted *ad infinitum*.

After indicating that the trade of the Pacific is eagerly sought after by all the great maritime powers, and that the completion of the Siberian railroad, now well advanced by Russia, will make the interests of the United States in the west as important as they are in eastern waters, it was asserted by Mr. Morgan in the recent debates in Congress that the States already had more need of fleets in the Pacific than in the Atlantic Ocean. "With this canal," he said, "we could move our ships of war upon short lines with abundant fuel, and concentrate a fleet in three weeks upon our western coast that we could not assemble in three months by doubling Cape Horn. In case of war with any trans-oceanic power we could certainly occupy the canal or the adjacent waters sooner than they could. Our proximity to and interest in the canal would give to us a moral power in this hemisphere that would keep the peace in all America against domestic turbulence and foreign assault." And again, on another occasion: "To the United States, in a political and strategic view, and as a sea-route to our Pacific coasts, this water-way is of greater importance than the Suez Canal is to Europe and Great Britain."

These opinions show the importance now attached in the States to the mastership of the water-way. Events in the Far East, and our political and industrial position in face of the whole world, render it imperative for us to

see what its strategic value is as regards Britain. The commercial problem, treated elsewhere, is another question.

The condition of affairs has greatly changed since the time of Nelson, and if the question was important then it has become even more momentous by the gradual growth of our shipping interests alone. But recent changes of a vast character in the extreme East, and the attitude of certain powers towards us, have emphasized the value of an alternative route for Britain to India, the China Sea, and the Pacific generally.

In opening an ocean route across the Isthmus of Suez, Europe, and mostly Britain, gained *per saltum* an enormous advantage over earlier conditions, but the equilibrium, disturbed by the cutting of the Suez Canal in the East, will be restored by the construction of the Nicaragua Canal in the West. The new passage will not be a mere water-way, for the canal receives a special political and international significance from the lake, as a sheltered naval stronghold, situated in a country whose resources make it capable of great development, in this respect being altogether dissimilar to the Suez Canal or the Panama project.

It is evident that our main line of communication with the East—the Mediterranean and the Suez Canal—is open to attack along the whole route from the English Channel to the Red Sea, and the recent action of France in China, Indo-China, and Madagascar, and the attitude of Russia in the East, coupled with the fact that the Siberian railway is rapidly being pushed forward, all

lend additional significance to the question. The proposed *Canal du Midi*, which, in the opinion of Frenchmen, if not in reality, would deal a damaging blow to the naval power of England, is also a factor not to be despised.

From all points of view, then, an alternative neutralized route is of the greatest consequence to Britain, one, too, with a clear run *viâ* the West Indies, where we have naval bases which can be made impregnable, and through a water-way which will be created by an English-speaking nation with common aims and aspirations.

In the course of the arguments in favour of the control of the canal by the United States, fears of Great Britain were expressed by several senators. Britain is encircling, with her cordon of military and commercial instrumentalities, not only the United States, but the whole civilized world, it was said. Every great pass in the highways of commerce has been seized and is being controlled by her; she wages a relentless and unceasing commercial and political warfare against every nation standing in her way; she is restless in the acquisition of territory, and is constantly extending her dominion on every continent and on every sea. The "grasping tendency" and "commercial rapaciousness" of Great Britain were dwelt on, and it was even pointed out how these had been fully realized by the first Napoleon, who, when engaged in negotiations for the sale of Louisiana to the United States in 1803, is reported to have said: "To emancipate nations from the commercial tyranny of England it is necessary to balance her influence by a

maritime power that one day may become her rival. That power is the United States. The English aspire to dispose of all the riches of the world. I shall be useful to the whole universe if I can prevent their ruling America as they rule Asia." And again, when the terms of cession were signed: "I have just given England a maritime rival that will, sooner or later, humble her pride."

It was gravely stated that the Pacific Ocean is dotted with British naval stations from Kamchatka to the China Sea, and from Hong-Kong to Esquimalt on the north and New Zealand on the south, "as the stars dot the heavens." In the Atlantic, it was said, commencing with the coast of Florida a line of British naval stations extends through the various islands of the Atlantic, *viâ* the Bermudas and Halifax, connecting with the great trans-continental railway, which in turn connects with the grand British naval station at Esquimalt, on the shores of Vancouver Island, and a trans-Pacific steamship line to China and Japan; while on the south the waters of the Gulf of Mexico are menaced at every strategic point by British naval establishments.

In view, therefore, of all these considerations, it was urged that even were there no other questions involved save those relating to provision for the common defence, the United States Government owes it to itself to aid in the early construction of the Nicaragua Canal.

The later American policy comprises, it must be remembered, the annexation of Hawaii, the undivided control of the Nicaragua Canal, and the acquisition of Cuba, or

some other strong naval station in the West Indies, while Canada and Newfoundland are not infrequently included. It would be fatuous not to take into account that a great change, amounting to a revolution, is taking place in American sentiment in this matter, one likely to be greatly accelerated by the late developments in the East, and still more by the completion of the Nicaragua Canal.

The alarmist statements, it is possible, may have been mainly employed to catch votes; may have been merely the political accompaniment to the cry which has so often been raised on the financial aspect, that British capitalists were straining every nerve to get their finger into the canal pie, and endangering the commercial position of the States. But, whatever the object may have been, notwithstanding their wild exaggeration these views exercised in the United States, and especially in Central America, an unfortunate effect, as was made clear on the occasion of the occupation of Corinto in the spring of this year.

A source of serious embarrassment was removed by the settlement in 1850 of the Mosquito reserve question, that territory having enjoyed a semi-independent position under the nominal protection of Great Britain from 1655. By the Clayton-Bulwer treaty, England resigned all claims to the Mosquito Coast, and by the treaty of Managua in 1869 ceded the protectorate absolutely to Nicaragua. The local chief died in 1864, and Nicaragua has never recognized his successor. Nevertheless, the reserve continued until 1894 to be ruled by a chief

elected by the natives, and assisted by an administrative council, which assembled at Bluefields, capital of the territory. In 1894 occurred the "Hatch incident," leading to the action taken recently by Britain.

The story of what is known as the "Hatch incident" is too long to give at any length, although it is grotesque enough to bear recital, but a brief reference may here



CLARENCE, CHIEF OF MOSQUITO LAND.

be made to the events which led up to the British action in Nicaragua. On the 16th of last August, Señor Madriz, the Nicaraguan Commissioner at Bluefields, the capital of the Mosquito territory, invited certain persons to attend at his office, among them being twelve British subjects—one of these the British Vice-Consul Mr. Hatch—and two citizens of the United States. On arrival, instead of being admitted into the presence of the Commissioner,

they were arrested and forcibly deported with great indignity from the country. No information whatever as to the cause of their arrest was given them, and they were denied all opportunity to arrange their affairs, or to visit their families, before their forcible expulsion. The two American citizens were in the following October permitted to return to the country, after something had been done to soothe their wounded susceptibilities. Some of the British subjects were "pardoned," and allowed to return towards the close of December, among those not "pardoned," however, being Mr. Hatch. For the violent treatment of her Consular representative Great Britain exacted a fine of £15,500 as punitive damages or "smart money," offering to leave to arbitration the question of the private losses of her subjects.

The recent action taken in Nicaragua by the British Government, in order to inculcate the most elementary principles of international law, aroused a strong anti-English feeling in the United States, a sentiment not at all appreciated by the English, who quite sincerely found it difficult to believe that America could make so much of, and misunderstand so greatly, such a trivial affair. But feeling undoubtedly did run high, and although needlessly so, yet with perhaps more grounds than people in England usually give credit for. However that may be, the mass of writing which appeared in the American press under the headings of the "English invasion of Nicaragua," "Hands off," and so on, gravely warning the British of the danger they ran in provoking American sentiment, following upon the language used in the

Senate, undoubtedly exercised a most mischievous effect in Nicaragua.

As I was present in Nicaragua throughout the whole course of the events which occurred in April-May of this year I may claim to be acquainted with what occurred there, as well as with the objects of our intervention. Not only in the American press, but amongst Americans in Central America, I was astounded to find that the impression obtained that England was moving in Nicaragua in order to secure control over the Nicaragua Canal.[1] I found it vain to attempt to assert that the sentiment in Britain was that we had, as the premier shipping nation, everything to gain and nothing to lose by the construction of the canal under the auspices of the United States.

Great excitement prevailed in Nicaragua, and the local journals went delirious. The press of the United States was inundated by telegraph with exaggerated and in-

[1] As far back as 1848, it must be borne in mind, Mr. Buchanan, Secretary of State, wrote as follows:—"The object of Great Britain in this seizure (of Greytown), is evident from the policy which she has uniformly pursued throughout her history, of seizing upon every valuable commercial point in the world, whenever circumstances have placed it in her power. Her purpose probably is to obtain the control of the route for a railroad and canal between the Atlantic and Pacific oceans, by way of Lake Nicaragua."—SQUIER, vol ii. p. 263.

This view has been sedulously cultivated by patriotic senators of the school of which Mr. Morgan is the leader. "Can it be expected," he asked in his Report submitted to the Senate in 1894, "that Great Britain will cease its efforts to gain control of the Nicaraguan Canal, and to hold the keys to the equatorial belt of commercial dominion that reaches round the world?" Calendar, No. 378. Senate. Report April 14th, 1894.

flammatory views. I was invited by a Nicaraguan paper to retrace my steps; to "return at once by the way I had come." The Monroe doctrine was in everyone's mouth. Nicaragua's hopes were without doubt centred in the expected interference of the United States Government, largely influenced by what was appearing in the American press, especially certain distorted interpretations of the Monroe doctrine,[1] which encouraged the view that territorial aggrandisement and the control of the inter-oceanic route were the real aims of the British.

The President telegraphed me[2] that it was a pity the question had been allowed to reach such an extreme, on the part of a powerful nation against a weak one, when it might have been settled by amicable discussion, which however had been roundly refused by Great Britain.

[1] There was a recrudescence of this chauvinism on the 4th July last, when some prominent men—such as Ex-Governor Campbell, and Ex-Senator Ingalls—made violent speeches on the Monroe doctrine, while Senator Lodge recently expressed a less flamboyant opinion.

[2] "Con gusto accedo á la solicitud de Ud relativa á pedirme noticias acerca del conflicto nicaragüense ingles por los buenos oficios de los E. E. U. U. y de las republicas centro-americanas Guatemala, el Salvador y Honduras, ha terminado la dificultad comprometiendose Inglaterra á retirar sus buques de las aguas nicaragüenses inmedia^{te}, y el Gob^{no} de Nicaragua á pagar las 15, 500 libras en Londres 15 dias despues de esa retirada. Las otras puntas del Ultimatum se arreglarán convenientemente enseguida por ambas naciones, es sensible que se haya llegado á esta extremidad de parte de una nación poderosa con un pueblo pequeño y debil pudiendo haberlo evitado par la discusion amigable que negó rotundamente la Gran Bretaña á Nicaragua.

De Ud
muy Atto. S. S.
J. S. Zelaya."

The United States Government, and the larger section of the whole people too, I believe, took altogether a soberer view of the Monroe doctrine, and recognized that Britain did nothing in Nicaragua which the United States themselves would not have done under similar circumstances The Nicaragua incident cleared the air, and was useful as a practical exposition of the Monroe doctrine, and of the obligations of the United States towards the various republics of Central America, as well as towards the West Indies and South America. It has been made evident that the position of the United States is not that of an involuntary power, whose armed force is to be at the beck and call of any American State that may find itself in need of aid.

The Venezuela question, it must be mentioned here, stands in altogether a different position, and approaches closely, if it does not actually come within, the sphere of the Monroe doctrine.

As originally announced, the scope of the Monroe doctrine was very narrow. Its formulation was due to a confidential proposal of Canning, then Secretary of State, to Mr. Rush, the United States Minister in London,[1] looking to the co-operation of the United States with

[1] Sumner says that Canning was its inventor and promoter, while substantially the same claim has been made on behalf of Jefferson, John Quincy Adams, and Monroe. One of the questions, containing the germ of the Monroe doctrine, which Mr. Canning asked Mr. Rush was, "Are the great political and commercial interests, which hang upon the destinies of the new continent, to be canvassed and adjusted in Europe without the co-operation, or even the knowledge, of the United States?"

England in 1823 to prevent "the holy alliance" of Russia, Austria, and Prussia from interfering to bring Spain's revolted provinces in South and Central America again into subjection to that Power. This was the means of calling the attention of Mr. Monroe and his cabinet to the question.

As independent republics the revolted colonies traded more freely with England than they had been allowed to do when subject to Spain, and England favoured their continued independence. The utterance to which the name "Monroe doctrine" is given is found in paragraphs 7, 48, and 49 of President Monroe's annual message of December 2nd, 1823, and, in view of its importance, the principal passages are given :

"At the proposal of the Russian Imperial Government, made through the Minister of the Emperor residing here, a full power and instructions have been transmitted to the Minister of the United States at St. Petersburg, to arrange, by amicable negotiation, the respective rights and interests of the two nations on the north-west coast of this Continent. A similar proposal has been made by his Imperial Majesty to the Government of Great Britain, which has likewise been acceded to. . . . In the discussions to which this interest has given rise, and in the arrangements by which they may terminate, the occasion has been judged proper for asserting as a principle in which the rights and interests of the United States are involved, that the American Continents, by the free and independent condition which they have assumed and maintain, are henceforth not to be considered as subjects

for future colonization by any European powers."—*Paragraph* 7.

"In the wars of the European powers in matters relating to themselves, we have never taken any part, nor does it comport with our policy so to do. It is only when our rights are invaded or seriously menaced that we resent injuries, or make preparation for our defence. With the movements in this hemisphere we are, of necessity, more immediately connected, and by causes which must be obvious to all enlightened and impartial observers. The political system of the allied powers is essentially different in this respect from that of America. This difference proceeds from that which exists in their respective governments. And to the defence of our own, which has been achieved by the loss of so much blood and treasure, and matured by the wisdom of their most enlightened citizens, and under which we have enjoyed unexampled felicity, this whole nation is devoted. We owe it, therefore, to candour and to the amicable relations existing between the United States and those powers, to declare that we should consider any attempt on their part to extend their system to any portion of this hemisphere as dangerous to our peace and safety. With the existing colonies or dependencies of any European power we have not interfered and shall not interfere. But with the governments who have declared their independence, and maintained it, and whose independence we have, on great consideration and on just principles, acknowledged, we could not view any interposition for the purpose of oppressing them, or controlling in any other manner their

destiny, by any European power, in any other light than as the manifestation of an unfriendly disposition towards the United States. In the war between these new governments and Spain, we declared our neutrality at the time of their recognition, and to this we have adhered, and shall continue to adhere, provided no change shall occur which, in the judgment of the competent authorities of this government, shall make a corresponding change, on the part of the United States, indispensable to their security. . . .

"Our policy in regard to Europe, which was adopted at an early stage of the wars which have so long agitated that quarter of the globe, nevertheless remains the same, which is, not to interfere in the internal concerns of any of its powers; to consider the government *de facto* as the legitimate government for us; to cultivate friendly relations with it, and to preserve those relations by a frank, firm, and manly policy, meeting, in all instances, the just claims of every power; submitting to injuries from none. But, in regard to these continents, circumstances are eminently and conspicuously different. It is impossible that the allied powers should extend their political system to any portion of either continent without endangering our peace and happiness; nor can any one believe that our southern brethren, if left to themselves, would adopt it of their own accord. It is equally impossible, therefore, that we should behold such interposition, in any form, with indifference."[1]—*Paragraphs* 48 *and* 49.

[1] United States House of Representatives Records, Presidential message of December 2nd, 1823.

The great diversity of view which has characterized discussions of the Monroe doctrine may be ascribed to several causes, *inter alia* the difference of mental attitude, a failure to consider, or at any rate to appreciate, the circumstances under which it took life, and a misunderstanding of the precise passages containing the doctrine. The two passages, frequently quoted as one and as if conveying one idea, are widely separated and relate to two different subjects. The former does not mean that the United States would resist any acquisition of territory on either of the American continents by a European power, as is clearly shown by the history surrounding it.[1]

[1] In 1821 the Emperor of Russia issued a ukase by which he assumed to exclude foreigners from carrying on commerce and from navigating and fishing within a hundred Italian miles of the north-west coast of America, from Bering Straits down to the 51st parallel of north latitude. As this ukase involved an assertion of title to territory which was claimed by the United States as well as by Great Britain, both those governments protested against it. In consequence the Russian Government proposed to adjust the matter by amicable negotiation at St. Petersburg; and instructions to that end were prepared for Mr. Middleton, then our Minister to Russia, in the summer of 1823. John Quincy Adams was then Secretary of State. At a meeting of the Cabinet on June 28th the subject of Mr. Middleton's instructions was discussed, and Mr. Adams expressed the opinion that the claim of the Russians could not be admitted, because they appeared to have no "settlement" upon the territory in dispute. On July 17th he informed Baron Tuyl, the Russian Minister, at a conference at the Department of State, "that we (the United States) should contest the right of Russia to any territorial establishment on this Continent, and that we should assume distinctly the principle that the American continents are no longer subjects for any new European colonial establishments." When the principle was announced in the message of December 2nd, President Monroe spoke of "future colonization."

Now, what was meant by the term "colonization?" The answer is,

While the announcement as to future colonization was made in general terms, applicable to the whole of the American continents, it related, in the message of President Monroe, solely to the territorial claims of the United States on the north-west coast. It was put forth with a view to protect those claims against encroachment, and, as an argument invented for the purpose, it did not become the subject of cabinet deliberation. This could not have been the case if there had been an intention to announce a new policy which the United States was to maintain in behalf of all the Americas.

This conservative statement did not, however, bind the United States to any particular line of conduct, and was, indeed, repudiated in 1825 by Congress in a resolution declaring that "the United States ought not to become a party with the Spanish-American republics to any joint declaration for the purpose of preventing interference by any of the European Powers with their independence or form of government." As recently as 1863 the Monroe doctrine was repudiated by the Republican Party when Secretary Seward, referring to the effort of France to establish a monarchy in Mexico, wrote to the United States Minister at Vienna that the United States "have neither right nor disposition to intervene in the internal affairs of Mexico, either to maintain a republican government or overthrow an imperial or foreign one." And again, Secretary Seward said: "Neither one nor all of

simply what was meant by the terms "settlement" and "colonial establishments," previously employed by Mr. Adams.—*The Monroe Doctrine.* John Bassett Moore, N.Y., 1895.

the contracting parties shall as a result or consequence of the hostilities to be inaugurated, exercise in the subsequent affairs of Mexico any influence calculated to impair the right of the Mexican people to choose and freely to constitute the form of their own government."

When Chili invoked the aid of the United States in her war against Spain, in 1866, Mr. Seward replied that the United States was not bound by the Monroe doctrine "to take part in the wars in which a South American republic may enter with a European sovereign, when the object of the latter is not the establishment of a monarchy under a European prince, in place of a subverted republic."

The doctrine does not, and never did, extend the United States protectorate over the Spanish-American states, nor does it assert the right of the United States to forbid European nations to make war upon any of these states for the enforcement of any claims, except those of conquest and domination. To be compelled to espouse their quarrels, without being able to control their conduct, is a position the United States is not likely to assume.

It must be remembered that the United States have themselves settled accounts with American states on several occasions, as well as Britain and other powers.[1]

[1] "In 1842, and again in 1844, Great Britain blockaded the port of San Juan; in 1851, laid an embargo on traffic at the port of La Union, in Salvador, and blockaded the whole coast of that country; in 1862 and 1863, seized Brazilian vessels in Brazilian waters in reprisal for the plundering of the bark 'Prince of Wales,' on the Brazilian coast. In 1838 France blockaded the ports of Mexico as an act of redress for

It was assumed in Nicaragua, and, to a certain extent, in the United States, that the occupation of the Corinto custom-house, in order to exact the amount of the fine demanded, was a violation of the Clayton-Bulwer treaty. But the "occupation" was not in exercise of dominion or sovereignty, which made all the difference. The British position as regards the Clayton-Bulwer treaty is clear. Earl Granville, when the question was raised in 1881, maintained that the British Government relied "with confidence upon the observance of all the engagements of that treaty,"[1] and to this position the British Government has persistently held. The arguments that the treaty

unsatisfied demands. In 1845 France and Great Britain blockaded the ports and coasts of Buenos Ayres for the purpose of securing the independence of Uruguay. From 1865 till some scarcely defined date Spain was at war with the republics on the west coast of South America, the bombardment of Valparaiso by a Spanish fleet being a prominent incident of the conflict. In 1831 a United States man-of-war dispersed the Buenos Ayrean colony on the Malvinas, or Falkland Islands, and released some of our citizens who had been arrested there for killing seals on the coast. In 1846 the United States went to war with Mexico. In 1854 the commander of a United States man-of-war, having failed to obtain from the town of Greytown an indemnity of $24,000 for the seizure and destruction of property, and an apology for an affront to the American minister by some of the inhabitants of the place, bombarded it, and afterwards, 'in order to inculcate a lesson never to be forgotten,' burned such buildings as were left standing. In 1859 the United States sent an expedition to obtain redress from Paraguay. In 1890, while the Pan-American Conference was in session, Congress passed an act to authorize the president to use force to collect a claim from Venezuela. In 1892 the United States sent an ultimatum to Chili, with which she had the wisdom to comply."—*The Monroe Doctrine.* John Bassett Moore, New York, 1895.

[1] Lord Granville, Despatch, November 10th, 1881.

lapsed on the non-completion of the original canal, and that it has been abrogated by change of circumstances, seem to be untenable; but it must be noted that, though in the eighth article of the treaty a general principle is established to include in its scope any other practical communication across the isthmus, this "general principle" is to be effected by "treaty stipulations." The contention of Secretary Frelinghuysen,[1] that the retention by the British of Belize was a violation of the treaty, is answered by the fact that that territory is excluded from the purview of the convention. To contend, as Secretary Blaine has done,[2] that "the Clayton-Bulwer treaty commands this government not to use a single regiment of troops to protect its interests in connection with the inter-oceanic canal, but to surrender the transit to the control of the British Navy," seems far-fetched, especially in view of the fact that the American Navy, even when he wrote, was not a *quantité négligeable*, and is yearly becoming stronger. Finally, as has frequently been pointed out, if the Clayton-Bulwer treaty were to be annulled, the British Government would recover its liberty of action.

The cry of "an American canal under American control" proceeds upon the theory that the government of the United States ought to exercise an actual and absolute control over the canal and its use. This theory, if endowed with force and substance, involves

[1] Mr. Frelinghuysen to Mr. Lowell, May 8th, 1882.

[2] Mr. Blaine to Mr. Lowell, November 19th, 1881, and November 29th, 1881.

the principle that the government of the United States shall have the right, not only to fix the conditions on which the canal shall be used, but also to permit or to forbid its use to any other nation, or all other nations, as circumstances may seem to require. Any such reserved power of exclusive control over the use of the canal would be both short-sighted and retrograde, and would not be acquiesced in by other nations.[1]

The tendency to treat international water-ways as highways of the world's commerce has become irresistible. The considerations by which this result has been brought about would apply with special force to the Nicaragua Canal. It would be in the largest sense an international highway, to which the commerce of all countries would at once be adjusted. The true policy of the United States, as well as of all other nations, is to neutralize it, by a general agreement that its use shall never be obstructed, either in war or in peace, and that it shall never be made the object or the theatre of hostilities.

[1] "A consideration of controlling influence in this question is the well-settled conviction on the part of this government," wrote Mr. Blaine, in 1881, "that only by the United States exercising supervision can the isthmus canals be definitely and at all times secured against the interference and obstruction incident to war. A mere agreement of neutrality on paper between the great powers of Europe might prove ineffectual to preserve the canal in time of hostilities. The first sound of a cannon in a general European war would in all probability annul the treaty of neutrality, and the strategic position of the canal, commanding both oceans, might be held by the first naval power that could seize it."

Might not this "first naval power" be the United States itself?

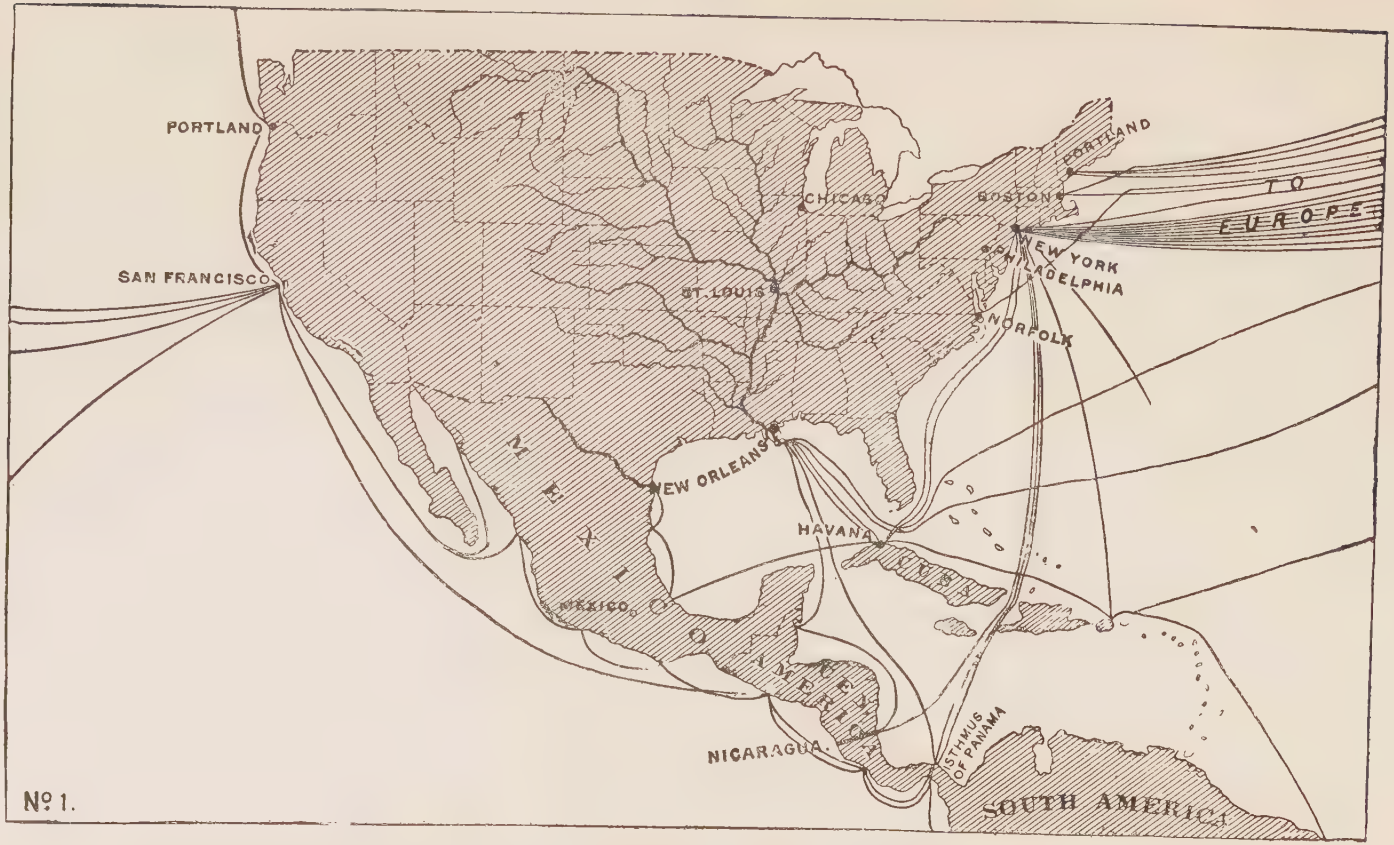
The time has gone by when such a highway could be controlled by any single Power. It is just 200 years—exactly 200, for it was in 1695—since William Paterson urged on Great Britain the acquisition of the isthmus. He proposed in memorable words that we should take possession of what he called "the keys of the world, enabling their possessors to give laws to both oceans and to become the arbiters of commerce." This, however, is no longer possible for any Power. Whoever cuts the canal, the keys will be, so to speak, in international commission, and the arbiters of commerce will be the Powers who control the largest amount of shipping.

The two great English-speaking nations, those most interested in the canal, could without doubt bring about its neutralization, with a better understanding of their respective aims, and a determination to co-operate in securing a result which would be of such importance to the whole world.

Chapter XIV.

EFFECTS OF CANAL.

THAT the Canal should meet with bitter opposition at the hands of the trans-continental railways of the United States was of course to be anticipated. It is now more than three-quarters of a century since the States entered upon inter-oceanic communication across the American continent, resulting eventually in the creation of the Northern Pacific, the Union and Central Pacific, the Southern Pacific, and the Panama railroads. These lines have been the main instrument in the marvellous development of the Pacific Slope; they have also been, however, the chief antagonists of the Panama and Nicaragua canal schemes. The trans-continental railroads, which have extracted such unreasonable rewards from the producers of the Pacific Slope, indirectly rack-renting that territory as few estates in Ireland have been, have throughout shown the keenest jealousy of their two great railway competitors, the Canadian Pacific and Panama lines. Unable to control these, they have done their utmost to prevent the accomplishment of water transit across the isthmus, and for that purpose have employed, and are still employing, all the powerful machinery



MAP OF STEAMSHIP LINES, SHOWING THE PRESENT COURSE OF AMERICAN FOREIGN COMMERCE.

utilized by great corporations desirous of preserving monopolies.

Their fears are in reality futile, for the canal would not only bring about cheap freight rates, of immense service to the community at large, but would also surely conduce to increased business and larger incomes for the railway lines. It would, there can be no doubt, help greatly to create on the whole Pacific Slope, as far east as the Rockies, a field of business, a new market, yielding profits transcending all now derived from trans-continental carriage.

The pressing question for the Pacific Slope, in its present stage of development, is how best to reach and utilize the markets of the Atlantic States and Europe, and, in order to accomplish this purpose, a more efficient means of communication,—one less costly, quicker, surer, —is required, and this is only to be had by opening a passage across the isthmus from the Pacific to the Atlantic. Of immense value to the people generally of the whole United States, the Nicaragua Canal is a matter of special importance to the Pacific coast. As in the case of similar projects elsewhere, the far-reaching changes which would be effected seem to have been incompletely realized. At any rate it has received a surprisingly inadequate measure of support in the very quarter which would be most benefited. The present acute depression in California has, however, stimulated interest in the question, and the community seem at last to be alive to the importance of the canal. "The development of our commerce, our industries, our international influence, and



NICARAGUA AS A SHORT LINE BETWEEN NEW YORK AND SAN FRANCISCO.

our political and military safety, all demand the prompt construction of the Nicaragua Canal," says a recent circular letter of the San Francisco Chamber of Commerce.

When the subject of the canal was first seriously raised on the Pacific Slope, about 1880, it was said that the trans-continental railways would furnish the necessary economical transportation for wheat to the Atlantic ports, whence it could be cheaply shipped to Europe. That promise remains unfulfilled, and the Cape Horn route, with its enormous detour, still takes the Pacific wheat trade.

The time for transportation will be reduced by the canal to twenty-five days, and the distance decreased by about 10,000 miles. The canal will open the markets of Northern Europe to Californian fruits and garden products. The export lumber trade of the North-west will receive a great stimulus. In 1886 the lumber trade of Oregon and Washington shipped 6,000,000 cubic feet, and a couple of years later the amount cut was 706,985,000. The forests of Washington are stated to contain not less than 175,000,000,000 feet of uncut yellow and red fir, and Oregon to possess 25,000 square miles of timber land; in fact, as William H. Seward said, the entire region of Oregon, Washington, British Columbia, and Alaska, seems destined to become a ship yard for the supply of all nations. Cargoes are now sent to Europe by Cape Horn, or by rail to the eastern seaboard and thence trans-shipped. When they can be carried at largely decreased cost, and much more rapidly, the trade will grow with giant strides. In addition to wheat

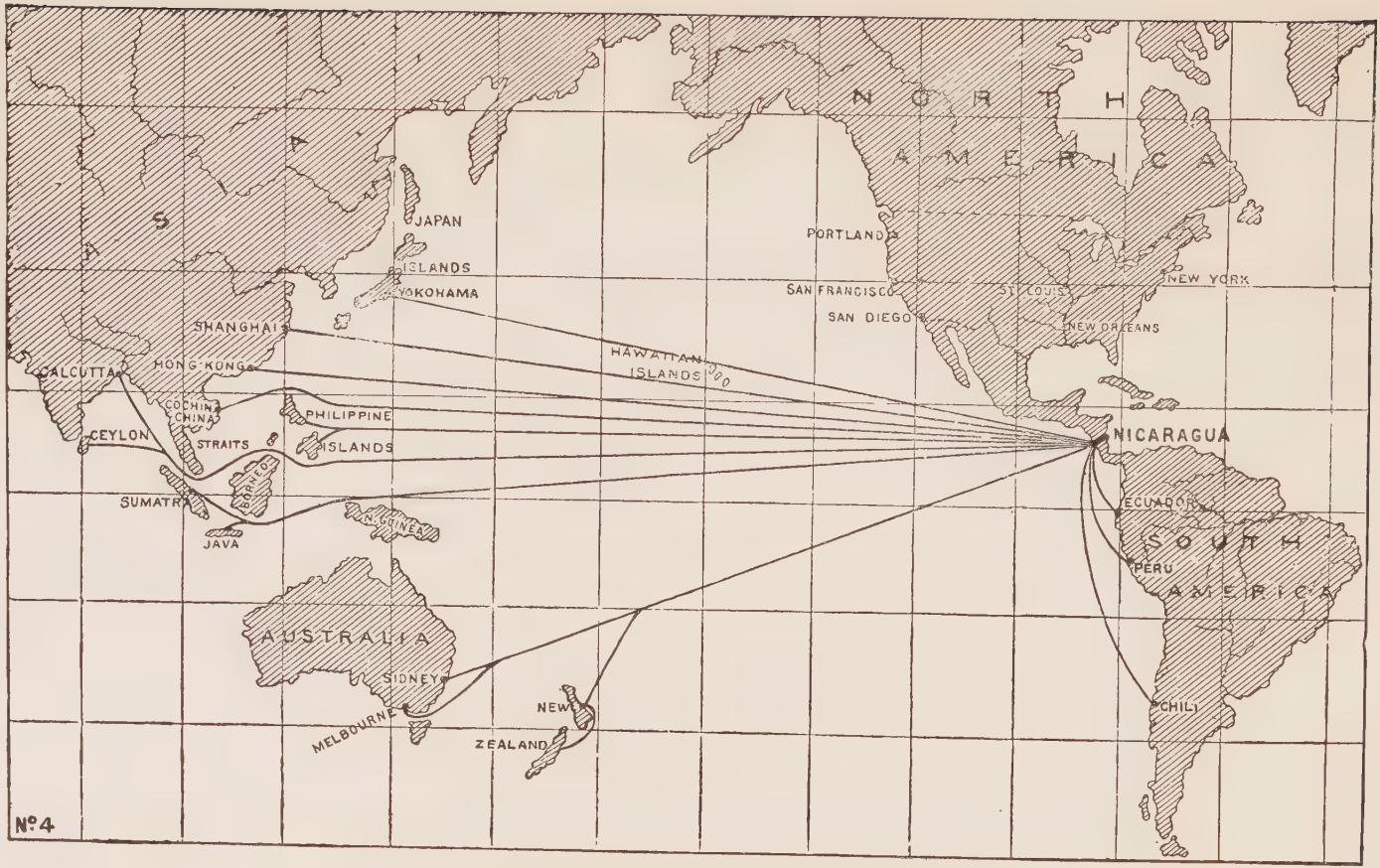


NICARAGUA AS A SHORT LINE BETWEEN NEW YORK AND PACIFIC.

and lumber, fish, wool, furs, and other commodities of the Pacific North-west will reach the markets of the world in increasing quantities by means of the canal.

I have indicated elsewhere that the sections of the United States which would be most benefited are the Pacific Slope and the Southern States, more especially the Mississippi Valley. A lengthened stay in the States a couple of years ago forced on me the conviction that in the South are best combined the advantages of all other sections, without their greatest drawbacks. The Mississippi region embraces over one-third of the total area of the United States, has 15,000 miles of navigable water, and a population of nearly 30,000,000 people. It contains 70 per cent. of the swine, nearly 60 per cent. of the milch cows, 55 per cent. of the cattle, and 40 per cent. of the forest lands found in the entire country. It produces also four-fifths of the corn (two-thirds wheat), valued at about £160,000,000 ($800,000,000) annually, while the live stock has an average value of £140,000,000 ($700,000,000). The "cotton belt," raising 3,500,000,000 pounds of raw material annually, is tributary to the Mississippi basin, of which New Orleans is the chief outlet for the exports, amounting to £500,000,000 ($2,500,000,000). Coal, iron, cotton, lumber, phosphates, all the foundations for vast manufacturing industries, are there in such proximity and abundance as may be found nowhere else in the world.

The progress made in the South during the past ten years has been striking. In 1880 the South mined 6,000,000 tons of coal; in 1893 the output was nearly



NICARAGUA AS A STARTING POINT FOR FOREIGN COMMERCE.

28,000,000 tons. The coal-fields of the Mississippi basin cover an area of 175,000 square miles, and produce over 85,000,000 tons of coal annually. In the production of pig iron in the United States, Alabama now stands third, and Illinois fourth, Pennsylvania and Ohio first and second. Of the total amount produced, the Mississippi basin yields over 80 per cent., while in the manufactures of steel (including rails), Pennsylvania and Illinois alone produce four-fifths of the output. Ten years ago the agricultural, manufacturing and mining products were in value about $1,200,000,000 a year; they are now nearly $2,000,000,000, and are annually increasing. The increase in the population of the South has been very slight, yet the production in ten years has increased by nearly $800,000,000. The railroad mileage has more than doubled, and the traffic quadrupled; the iron and coal production and the cotton mills have added nearly $2,000,000,000 to the assessed value of property, and more than doubled banking capital. Fifteen years ago the cotton seed was a waste product; now nearly 300 cotton seed oil-mills represent an investment of about $40,000,000. Such, briefly, is the record of the South during a period of almost overwhelming obstacles.

In Western Spanish-America the Southern States will, by means of the canal, gain access to an important field, at present commercially nearer to Europe, though physically further off.[1] A straight line drawn down the

[1] The chief articles consumed by the Spanish-American countries, excepting those in the far south-western portion of South America, where the climate is temperate, are flour, provisions (comprising meat

Mississippi basin through Lake Nicaragua skirts practically the whole western coast of South America. Buyers in this region have hitherto taken from the States only such articles as could not be got from Europe, but the Nicaragua Canal will give a direct avenue to this great market.

As regards the Far East, the enormous saving in distance and in time would place the Southern States in a position to share in the business of those Eastern countries which are such large consumers of cotton goods, at present mostly made in Great Britain.

In America the trend of development is no longer west, but south. The Southern States only require opening up by internal and external communications to have their marvellous resources developed. With the improvement of the internal water-ways, with "direct trade" established by steam communication to Europe, and finally, but most important of all, with the opening of the Nicaragua Canal, no limit can be set to the future progress and prosperity of the South. The "direct trade" movement is growing in favour throughout the South and South-west. It is evident that there is something wrong with the methods of transporting the products

and dairy products), articles of furniture, wood and its manufactures, carriages, agricultural implements, iron and steel and manufactures of these, oils, soaps, drugs and chemicals, coal, fancy articles, leather and its manufactures, paper and stationery, malt liquors and spirits, manufactures of wool, gunpowder and other explosives; earthen, china and glassware, flax, hemp, and their manufactures. Among the products of the Southern States are quantities of cotton goods and manufactures of cotton.

of the whole South to the markets of the world. They have too long been forced to seek the northern seaboard ports by long and expensive railway hauls across country, costly both to producer and consumer. The people of the South seem at last determined to make an effort to direct their commerce to its natural outlets—the Gulf ports and those on the South Atlantic coast.

The future in store when the valleys of the Mississippi, the Orinoco, and the Amazon are completely reclaimed and cultivated up to the capacity of production is "such that no limner can draw, no fancy can sketch," said Maury, in treating of his favourite Mississippi, to which he could find no parallel in the whole world. Of the Caribbean Sea, Maury was fond of repeating that never was such a concentration upon any sea of commercial resources, never was there a sea known with such a back country tributary to it. "A straight line drawn from the headquarters of the Amazon to the headquarters of the Mississippi measures a quadrant of the globe," he said. "In the small compass of the West Indian Sea are crowded together the natural outlets of the ocean, from mountains, plains, and valleys that embrace every variety of production, every degree of latitude and climate, from perpetual winter to eternal spring. Here are included both hemispheres; when it is seed time in one basin, it is harvest in the other. In this southern sea there is always a crop on the way to market from one or the other of its basins. It has for a back country a continent on the north, another on the south, and a world both to the east and west. It is contiguous to the two first, and

it is convenient to them all. Those great outlets of commerce,—the delta of the Mississippi, the mouths of the Hudson and Amazon,—are all within ten days' sail of the isthmus. It is the barrier which separates us from six hundred millions of people,—three-fourths of the population of the earth. Break it down, therefore, and this country is placed midway between Europe and Asia, this sea (Caribbean) becomes the centre of the world, and the focus of the world's commerce."

The fertility and resources of Nicaragua constitute a feature telling strongly in favour of the future value of the canal. The Panama isthmus, in addition to being very unhealthy, is a region of floods with very poor local resources; the Suez Canal runs through a sandy desert. Nicaragua stands in marked contrast to both these projects. It has a climate immensely superior to that of Panama, a fertile soil, and internal water communication, with great resources, both vegetable and mineral, which have been already described. Here it is sufficient to note the coffee, sugar, cochineal, indigo, cacao (perhaps the finest in the world), india-rubber, cotton, and all tropical fruits, forests of mahogany, cedar, grenadilla, black walnut, ebony, and various dyewoods; rich mines of gold and silver, some of which (notwithstanding the difficulties of transportation and labour) have for years been profitably worked, mostly with English capital. When the two lakes are connected by the short proposed water-way, and the country is opened by a main artery of water communication, supplemented by railroads, tramways, and roads, it is safe to predict a

great future for Nicaragua. The lakes, but especially the Lake of Nicaragua, will doubtless play an important part in the process of development. The undeveloped water-power will of course be fully utilized. The fall of more than 100 feet in a distance of only 4 miles on the Pacific Slope, and 12 miles on the Atlantic side, under perfect control, will be available to serve commercial purposes. The work recently accomplished at Niagara is the forerunner of similar undertakings. It is possible, too, that shipbuilding yards, factories, and docks may yet line the lake, where will assemble the whole fleets of the world. Important towns will spring up. The Nicaragua Canal, therefore, will be something more than a mere passage-way from ocean to ocean. There will occur what was not possible in the case of the Suez Canal, what could never have taken place in the case of Panama, a great local development. With all its advantages, that inland sea seems destined to astonish the world.

The forecasts of the probable amount of traffic which will be attracted to any inter-oceanic canal vary greatly, as might be expected, for the problem is one of extreme intricacy. Particular deductions from general traffic statistics, in far simpler cases, have been proved again and again to be far from infallible, and here the difficulty of determining the relative value of the various factors is rendered more complex by the element of futurity. The principal estimates are:

	Tons.
Mr. Nimmo, U.S. Bureau of Statistics, 1880, possible traffic	3,706,000
Admiral Ammen, U.S. Navy, 1876	4,833,000

	Tons.
M. Levasseur, 1878	5,250,000
M. Levasseur and associates, 1879, estimate for 1888	7,250,000
Nicaragua Maritime Canal Company, 1889	8,121,093
Nicaragua Canal Construction Company, probable in 1897	9,933,302

As there is some confusion as to the meaning of the oft-quoted estimate of 1879, I give here what M. Levasseur said: "The meaning of these figures must not be misunderstood; they do not signify that 7,250,000 tons will necessarily pass through the Canal the year of its opening, or even in the following years. We give *en bloc* the gross amount (*le nombre brut*), we do not apportion to each of the lines of communication which will then exist its share the Canal must create its share." Lesseps used these figures, however, as "the most moderate estimate of the traffic which the maritime canal can realize."[1] Certainly a very free interpretation of Levasseur's conservative and guarded statement.

According to the Canal Company, it appeared that the number of ships trading from the eastern ports of North America and from Europe to the North and South Pacific in 1879 was 2,647, with an aggregate tonnage of 2,671,886 tons, and eight years later, in 1887, statistics showed the traffic to be 4,507,044 tons. Except the traffic by the railway across the isthmus, the foregoing was all round the Horn, and no trade by the Cape of Good Hope and Suez Canal was included.

The following was the Company's summary of the

[1] "Souvenirs de quarante ans," p. 452.

approximate estimate of the tonnage in 1889, which the canal might be expected to control, if it were open to traffic :[1]

	Tons.
First class, entirely tributary	5,332,415
Second class, from tonnage largely tributary . .	2,526,542
Third class, from tonnage partially tributary . .	262,136
Total	8,121,093

The calculation of the Panama Canal Company in 1879 that the canal would, the first year it was opened (in 1889) have a traffic of 7,250,000 tons, was, as I have shown, not justified, and yet we find the Maritime Canal Company actually raising the amount to over 8,000,000.

On the other hand, it will be seen that Mr. Nimmo calculated the possible traffic in 1880 at 3,706,000 tons, and the probable traffic at little more than half that amount—under 2,000,000 tons. This estimate may be pronounced altogether too pessimistic.

The truth may here, as elsewhere, be found somewhere about midway between the two extremes. We fortunately possess in the Suez Canal an example

[1] The trade which would be subsidiary to the canal at its opening (in 1897), was summarized thus :

	Tons.
Traffic existing in 1889, as estimated . . .	8,121,093
Natural growth of same by 1897 (10 per cent.) .	812,209
New business developed by opening of the canal .	1,000,000
Aggregate	9,933,302

which will help us to a considerable extent to judge the yearly increase of traffic to be expected through an inter-oceanic passage, which in the main features is its complement. The traffic of the Suez Canal in the ten years 1882-1892 rose from 5,070,000 to 7,710,000, equal to 5·4 per cent. per year. The Sault Ste. Marie traffic rose in the same period about 360 per cent., or 36 per cent. a year, but of course that work, useful for purposes of comparison in dealing with the engineering factors of the problem, is not apposite to the present consideration.

If the increase of traffic which would probably pass through the canal be taken at the rate of 5 per cent. per annum, the extreme estimates would be in 1903 (the year of opening, if the canal were begun next year), as follows :

Mr. Nimmo, say, 1,853,000 in 1880 . . .	3,983,950
The Canal Company, 8,122,093 in 1889 . .	14,048,000
which would give a mean of	9,015,975

The Suez Canal, in 1903, would, at its present rate of increase (5·4 per cent.), have a tonnage of about 12,000,000.

It would be as grave a mistake to under-estimate as to exaggerate, and the case of Suez must be recalled, how the whole idea was pooh-poohed and ridiculed. The canal could not be made ; if made, it would never pay, it was said in this country, though it should have been apparent that, once completed, the canal, of immense advantage to the whole world, would principally benefit Britain.

Assuming, for 1905 (two years after its opening), 7,000,000 tons, which I believe reasonable, the canal toll, at the rate of 7*s.* per ton (the present Suez rate) would be £2,450,000 gross income. Deduct for maintenance say £600,000 (I have assumed £400,000), the highest figure I have seen used, we arrive at £1,850,000. Or from the £2,450,000 gross income let us assume as net profit 70 per cent., and we arrive at £1,715,000. Now, £1,800,000 would give 9 per cent. on £20,000,000, 6 per cent. on £30,000,000, 4½ per cent. on £40,000,000.

The general trend of the great bulk of the commerce and intercourse of the world is now and always must be on eastward and westward lines. An examination, no matter how casual, of any world-map will make clear the geographical relations of seas and continents, and the present arrangement of commercial lines of transit by ocean and land. It will be seen how correlative, in these respects, the Central American isthmus is to that of Suez.

It becomes at once apparent that, while the Suez Canal is immediately important to the commerce of Europe with Southern and Eastern Asia, the Nicaragua Canal is so to the countries of North, Central, and South America.

The Canal will bring into the closest connection:

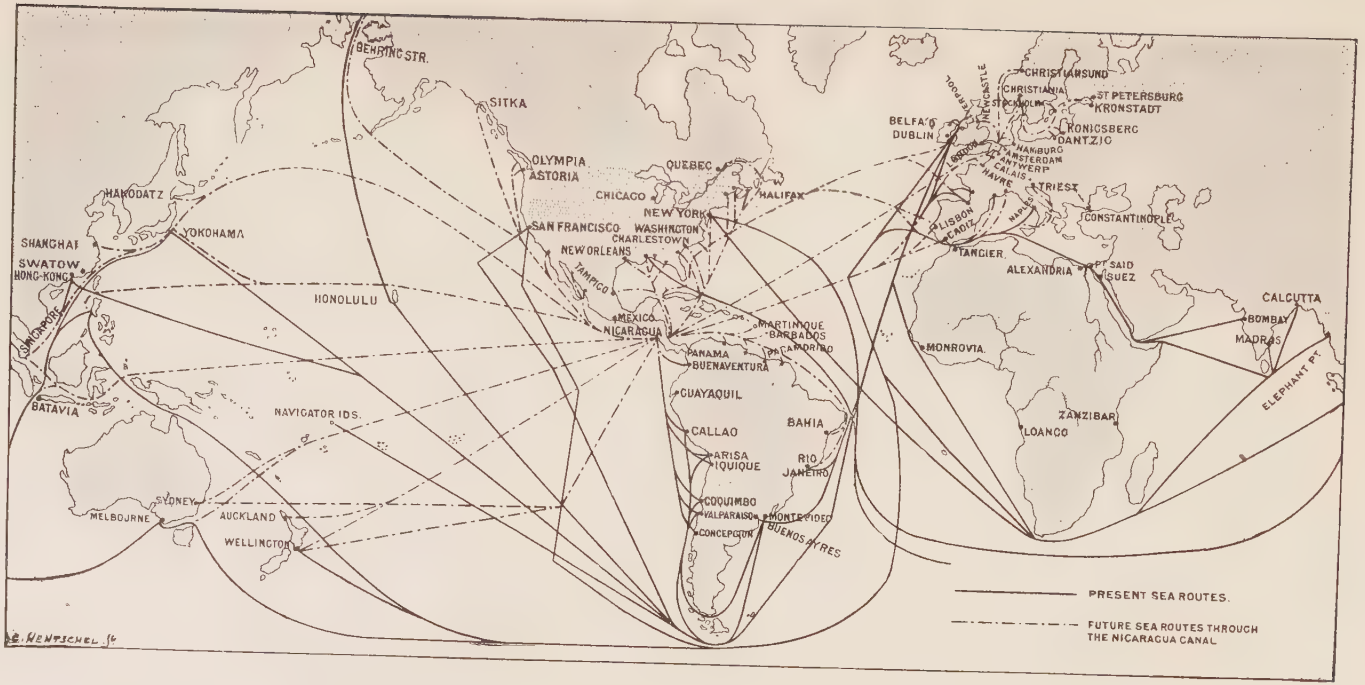
(1) The eastern and western coasts of North America.

(2) The eastern and western coasts of South America.

(3) The western coasts of South America with the eastern shores of North America; and

(4) The eastern coasts of South America with the western shores of North America.

As regards Europe the gain will be merely in the



WORLD-MAP, SHOWING PRESENT AND FUTURE SEA ROUTES THROUGH THE NICARAGUA CANAL.

Pacific littoral of the two Americas and in the South Sea islands. Our trade with the whole East and Australia will continue to use the Suez Canal. On the other hand, the gain for America is evident, embracing the whole field of Japan, China, eastern Indo-China, Malaysia, and Australasia.

The great maritime routes of the world's trade will be, in a large degree shortened. The savings of distance likely to be affected are shown in the diagrams, while the following table shows the distances between commercial ports of the world, and the distance saved, according to the canal authorities.

From	*Viâ* Cape Horn.	*Viâ* Cape of Good Hope.	*Viâ* Nicaragua Canal.	Distance Saved.
	Miles.	Miles.	Miles.	Miles.
New York to—				
San Francisco	14,840	—	4,946	9,894
Behring Strait	17,921	—	8,026	9,895
Sitka	16,105	—	6,209	9,896
Acapulco	13,071	—	3,122	9,949
Mazatlan	13,631	—	3,682	9,949
Hong Kong	18,180	15,201	11,038	4,163
Yokohama	17,679	16,190	9,363	6,827
Melbourne	13,502	13,290	10,000	3,290
New Zealand	12,550	14,125	8,680	3,870
Sandwich Islands	14,230	—	6,388	7,842
Callao	10,689	—	3,701	6,988
Guayaquil	11,471	—	3,053	8,418
Valparaiso	9,750	—	4,688	5,062
New Orleans to—				
San Francisco	15,052	—	4,047	11,005
Acapulco	13,283	—	2,409	10,874
Mazatlan	13,843	—	2,969	10,874
Guayaquil	11,683	—	2,340	9,343
Callao	10,901	—	2,988	7,913
Valparaiso	9,962	—	3,987	5,975

From	*Viâ* Cape Horn.	*Viâ* Cape of Good Hope.	*Viâ* Nicaragua Canal.	Distance Saved.
	Miles.	Miles.	Miles.	Miles.
Liverpool to—				
San Francisco	14,690	—	7,694	6,996
Acapulco	12,921	—	5,870	7,051
Mazatlan	13,481	—	6,430	7,051
Melbourne	13,352	13,140	12,748	392
New Zealand	12,400	13,975	11,349	1,051
Hong Kong	18,030	15,051	13,786	1,265
Yokohama	17,529	16,040	12,111	3,929
Guayaquil	11,321	—	5,890	5,431
Callao	10,539	—	6,449	4,090
Valparaiso	9,600	—	7,436	2,144
Sandwich Islands	14,080	—	9,136	4,944
Spain to Manilla	16,900	13,951	13,520	431
France to Tonquin	17,750	15,201	13,887	1,314
Hamburg to—				
Mazatlan	13,931	—	6,880	7,051
Acapulco	13,371	—	6,320	7,051
Fonseca	11,430	—	5,530	5,700
Punta Arenas, Costa Rica	11,120	—	5,515	5,605

From	To Eastern Entrance of Nicaragua Canal.	From	To Western Entrance of Nicaragua Canal.
	Miles.		Miles.
New York	2,021	San Francisco	2,776
Liverpool	4,769	Valparaiso	2,518
Hamburg	5,219	Callao	1,531
Amsterdam	4,994	Portland	3,219
Havre	4,874	Victoria	3,428
Cadiz	4,220		
New Orleans	1,308		

NOTE.—The distances have been measured by customary routes most convenient for *sailing ships and slow freight steamers*. From the figures in the first column, 2,000 miles must be deducted for steam vessels taking the route *viâ* the Straits of Magellan.

It will be noticed that this statement omits the distances by Suez Canal, which I give for the more important places.

Comparison of Distances *viâ* Suez and Nicaragua.

From	*Viâ* Suez Canal.	*Viâ* Nicaragua Canal.	Difference in favour of—
	Miles.	Miles.	Miles.
Liverpool to—			Suez.
Singapore ..	7,958	14,326	6,368
Hong Kong	9,810	13,786	3,976
Yokohama...	11,765	12,111	346
Melbourne...	11,350	12,748	1,398

From	*Viâ* Suez Canal.	*Viâ* Nicaragua Canal.	Difference in favour of—
	Miles.	Miles.	Miles.
New York to—			Suez.
Singapore ...	11,549	11,578	29
			Nicaragua.
Hong Kong	13,401	11,038	2,363
Yokohama...	15,314	9,363	5,951
Melbourne...	14,920	10,000	4,920

From	*Viâ* Suez Canal.	*Viâ* Nicaragua Canal.	Difference in favour of—
	Miles.	Miles.	Miles.
New Orl'ns to—			Nicaragua.
Singapore ...	12,100	10,865	1,235
Hong Kong	13,650	10,325	3,325
Yokohama...	14,650	8,650	6,000
Melbourne...	14,790	9,287	5,503

Liverpool *versus* New York.

From	To Liverpool.	To New York.	Difference in favour of—
	Miles.	Miles.	Miles.
	Viâ Suez Canal.	*Viâ* Nic. Canal.	Liverpool.
Singapore ...	7,958	11,578	3,620
Hong Kong...	9,810	11,038	1,228
			New York.
Yokohama ...	11,765	9,363	2,402
Melbourne ...	11,350	10,000	1,350
	Viâ Nic. Canal.		
San Francisco	7,694	4,946	2,748
Callao	6,449	3,701	2,748

Liverpool *versus* New Orleans.

From	To Liverpool.	To New Orleans.	Difference in favour of—
	Miles.	Miles.	Miles.
	Viâ Suez Canal.	*Viâ* Nic. Canal.	Liverpool.
Singapore ...	7,958	10,865	2,907
Hong Kong...	9,810	10,325	515
			New Or'ns.
Yokohama ...	11,765	8,650	3,115
Melbourne ...	11,350	9,287	2,063
	Viâ Nic. Canal.		
San Francisco	7,694	4,047	3,647
Callao	6,449	2,988	3,461

Absolute gain effected by opening of Nic. Canal.

From	To Liverpool.	To New York.	To New Orleans.
	Miles.	Miles.	Miles.
Singapore ...	...	...	1,235
Hong Kong...	...	2,363	3,325
Yokohama ...	..	5,951	6,000
Melbourne ...	..	4,920	5,503
San Francisco	6,996	9,894	11,005
Callao	4,090	6,988	7,913

Through the Suez Canal, England has at present the advantage of the United States, as regards China, Japan, and Australia, by about 2,700 miles. The Nicaragua Canal made, the Atlantic cities of the States will be only 1,000 miles further from Hong Kong and Central China generally than Britain; 1,200 to 1,900 miles nearer the northern ports of China, Corea, and Japan; 2,700 miles nearer the average of the western ports of South America; 1,300 miles nearer Melbourne; over 3,000 miles nearer New Zealand. The canal will bring New Orleans 1,000 miles, and the Gulf ports from 700 to 1,000 miles nearer again than New York. The canal will place the States in touch with 500,000,000 people, with whom at present they have comparatively little intercourse, namely, the peoples of China, Japan, Corea, Australasia, Malaysia, Ecuador, Bolivia, Peru, and Chili.

The question of the Far East is one of immense importance. The trade of this country with China, important as it is now, may develop immense proportions, and within a short period, should the long-threatened construction of railways be once undertaken. The long-expected awakening of China, of that marvellous country to whose resources I have in past years repeatedly drawn public attention,[1] has not yet come, but it is not far off, for the struggle from which it has just emerged will certainly serve to awaken the millions of China from the sleep of centuries. Considering, too, the

[1] "Across Chrysê," 1882; "The Opening of China," 1884; "English Commercial Policy in the East," 1885.

growing strength of Russia and the policy of France, to say nothing of other countries, the stimulus of foreign powers in various forms is not likely to be wanting. The advantages certain to result from the introduction of railways into a country like China need not be dwelt on here at any length. Whether commercial or administrative, they are certain to be immense. Apart altogether from strategic considerations,[1] railway communication in China would mean the break-up of the autonomy system, which must be the first step in the regeneration of China, bringing about gradually improved administrative control, social benefits from the employment provided through new regions opened to the poorer classes, increased means of the people to pay duties and taxes, and the augmentation of revenue by a more direct and assured payment.

In the case of railway making, *ce n'est que le premier pas qui coûte.* When a nation once starts building railroads it never stops, and in the next quarter of a century

[1] Li Hung Chang told me, in 1883, that in his opinion had railways existed from Central China to the South, there would have been no Tongking question. This point I pressed upon the attention of His Majesty the King of Siam, in 1884, personally and in a memorandum drawn up by me at Bangkok, urging the necessity of railways for Siam, *inter alia* as the surest safeguard against the aggression of any foreign power. "As regards the political value," I wrote, "Siam, like China, has now a conterminous frontier with France, with this difference, that the Franco-Chinese frontier is 300 miles in length, while that of Siam and France measures twice that amount. The importance of having places like Luang Prabang and Korat linked on by railway with the capital is self-evident." The Siamese probably have recognized ere this the cogency of this view.

we shall see an enormous mileage of railways laid down in China. Where will the railway plant come from? Which country will have the largest slice of the trade? With the canal built, placing the United States in a much more advantageous position, the competition will be very keen for all classes of business, and this country should prepare for the coming competition.

Turn to Japan. Japan has 40,000,000 of people, intelligent, enterprising, progressive, as has been amply proved by the late campaign, through which at a bound they have taken rank amongst the first powers of the world. Of the total trade about 36 per cent. is with Britain, 21 per cent. with the United States, 16 per cent. with China. Japan has already some 2,000 miles of railroad, and further construction is going on in every direction. It is only some seven years ago (in 1888) that she commenced to manufacture cotton, taking 84,000 pounds from the South. In 1891 she took 7,000,000 pounds and in 1895 there are in operation 1,000,000 spindles. When the canal is built, will the Southern States not supply Japan with all the cotton goods she requires? The South has the cotton right at the mill doors, has the cheapest fuel in the whole world, has less costly labour than elsewhere in the United States. The cotton industry of Lancashire is, without doubt, seriously threatened by these and other changes.

The profound alterations occurring in the Far East are not only political but industrial. While one oriental nation has proved herself master in the use of naval as well as military force, and has altered the political

balance of power, necessitating the increase in the Pacific of the naval strength not only of Great Britain, but of the United States and other powers, an industrial revolution is taking place, which should afford ample cause for reflection to a commercial and industrial country like Britain. I believe, with the late Professor Huxley, that we are entering upon the most serious struggle for existence that this country has seen, and that we shall have to rouse ourselves if we are to meet and compete with the advancement of the East, and the enterprise and energy of the West.

The question of new markets is at last beginning to receive the attention it deserves. It is now some fifteen years ago that, while serving in India, I began to pay attention to this subject, and I spent many years of hard work in the field of exploration and survey abroad, and on the platform at home, in doing all I possibly could to stimulate this policy. It was becoming apparent then, and should be evident now, that our true course of action was to foster and develop the increasing trade with the Colonies and British possessions, and to open new markets. I pointed out with what force I could, by addresses to the mercantile community throughout the country, in the press, and elsewhere, that the areas for the extension of our commerce were to be found in our colonies and in the unopened markets of Asia and Africa, and I divided these markets into two classes: (1) Immediate markets, such as China and Indo-China; (2) Markets of the future, such as Africa. I maintained again and again that we had been proceeding on the old, comfortable, but unwise

system of permitting things to arrange themselves, a policy of *laisser aller*, and that our methods would have to be reformed if we were to hold our own.[1] It is satis-

[1] "Various causes have of late years conduced to compel the commercial community to consider carefully the position of Great Britain in the international commercial contest. Among these have been the general very grave depression of trade, the hostile tariffs enacted against our goods, and the activity of our Continental neighbours and rivals in competing, not only in manufactures, but in the carrying trade and distribution abroad. The hunger for new outlets, the result of the inadequacy of the home markets for the growth of their manufactures, has resulted in a scramble for colonies, where tariffs unfavourable to England will in most cases be enforced. It has at last begun to sink into the minds of Englishmen that the industrial states of Europe have during the last twenty years relatively developed their foreign trade and mercantile marine more rapidly than ourselves.

"There can be little doubt that Continental trade is now entering on another new phase, by which our extent of business and profits will be still further reduced. Having succeeded in manufacturing, our European customers are now striving hard to become the carriers of raw materials and goods, in competition with England. The development of railway and banking facilities on the Continent has contributed considerably to the means of working this change, while the opening of the Suez Canal and Alpine tunnels has facilitated the diversion of traffic from British ports. The growth of Continental ports, the improvement of their dock accommodation with increased facilities for loading and unloading vessels, the long hours of labour, the modicity of wages, a familiarity with the local language, and a certain patriotic preference for dealing with their own countrymen—the combination of these various causes has led to an increase of trade in foreign ports alarming for us. The search for and annexation of new markets has now become a prominent phase in their programme.

"We have until the present time proceeded on the old, comfortable, easy system of permitting things to arrange themselves, and the only policy, or what has taken the place of a policy, has been *laisser aller*. This was possible while markets were to be had at will, and customers more numerous than producers. But now, with overstocked markets at

factory to note that a leading statesman like Mr. Chamberlain is taking up the question, and that there is prospect of the policy being carried into effect. It must be borne in mind, too, that in Lord Salisbury we have a Prime Minister who, thirty years ago, was fighting for the extension of British markets in Indo-China, and, "both in the interests of England and British Burmah," sanctioned on two occasions a railway survey to S.W. China, which, however, was never carried out, and the opportunity, for the time being, passed away.

In connection with this question of new markets, it must be understood that the greatest relative increase is in those remote regions, such as the Colonies and South America, where yearly are being opened new fields for commercial enterprise. The trade between Great Britain and her colonies is growing much more rapidly than the world's general commerce. But, if the question of fresh markets be an important one, that of communications,

home, our population increasing, and hemmed in by competition and hostile tariffs on all sides, we must not only reverse this easy-going policy, but throw ourselves into the struggle with our utmost energy and intelligence. There is room here in abundance for drastic reform. The only remedy for this state of affairs is to discover new customers who are to be found in new markets, and in developing those already existing. These areas for the extension of our commerce are to be found in the colonies and in the unopened markets of Asia and Africa. The value of British colonies and possessions is not even yet recognized by the mercantile and manufacturing classes of the country, still less by the working man. They are by far our best customers.

"It should be our policy to foster and develop the increasing trade with the colonies and British possessions and to open new markets."—*Report on the Railway Connexion of Burmah and China*, by Archibald R. Colquhoun and H. S. Hallett, 1887.

that of the main ocean highways, to reach and command these markets, is not less pressing.

A large portion of the advantages arising from this improvement in communications cannot fail to accrue to this country, having about 56 per cent. of the carrying trade of the world. It is impossible to foretell even the direct and immediate commercial results of the redistribution of trade lines on a large scale. But to every one in Great Britain, as well as in the States, the canal will make some difference, and to many a great change. It will be attended not merely by commercial but political consequences of a far-reaching nature, which, while they cannot be predicted with precision, have been indicated as clearly as possible.[1] There is time before the completion of the canal to consider the problem in the many bearings which it presents, and it is well worth study. To Britain, with its overwhelming interest in ocean traffic, the construction of this work must be of the first importance, bringing us thousands of miles nearer to the Pacific shores of the New World, and presenting possibilities for the development of a new traffic which may prove as far

[1] Humboldt drew attention more than seventy years ago to the political effects which the canal might produce. "The trade of the world can undergo no great changes," he wrote, "that are not felt in the organization of society. If the project of cutting the isthmus that joins the two Americas should succeed, Eastern Asia, at present insulated and secure from attack, will inevitably enter into more intimate connections with the nations of European race which inhabit the shores of the Atlantic. It may be said, that that neck of land against which the equinoxial current breaks, has been for ages the bulwark of the independence of China and Japan."—*Personal Narrative*, etc., vol. vi., p. 297.

in advance of present calculations as to-day's traffic through the Suez Canal is ahead even of the estimates of its ardent promoter.

Even if it be conceded (which I by no means do) that, for the first few years after opening, the canal may not prove a great financial success, it would meet its reward in the stimulus which it would give to existing trade, and by the creation of an entirely new commerce between the Atlantic States and the Far East. Not only will a new route be created, but fresh fields will be opened.

The canal will do away with the great geographical obstacles involving the circumnavigation of Cape Horn; will place the ocean coasts of the United States 10,000 miles closer to one another; will move the neutral competing zone of the Atlantic sea-borne commerce of the United States and Britain from the Pacific coast of South America across to Western Australia, and from the Pacific coast of North America to within the Pacific coast line of China.

The canal will complete a perfect equatorial belt of navigation around the world, through the gateways of Suez and Nicaragua. No greater impulse to commerce could be given than this complement to the Suez Canal.

With the resources now controlled by man, he will no longer consent to allow that narrow neck of land to bar one of the principal trade roads of the world, and to divert steamer traffic by thousand of miles.

The conclusions I have formed on the Nicaragua Canal are:

(1.) It will render greater service to the New World than the Suez Canal does to the Old.

(2.) It will bring Japan, Northern China, Australasia, and part of Malaysia nearer to the Atlantic cities of the United States than they are now to England.

(3.) It will benefit America in an infinitely greater degree than it will Europe, which will only use the canal in trading with the Pacific littoral of the two Americas, the South Sea Islands, and possibly New Zealand.

(4.) It will divert little or no European traffic from the Suez Canal.

(5.) It will give an immense impulse to United States manufactures, especially cotton and iron, and will greatly stimulate the shipbuilding industry and the development of the naval power of the United States.

(6.) It will cost more than the estimates show, but it will have a traffic greater than is usually admitted.

(7.) In the interests of the world it must be neutralized, and the true policy of the United States is to forward that end and thus make of this international highway a powerful factor for the preservation of peace.

I believe that the canal can be made, and that, long hindered by political difficulties alone, it will now be carried out under the auspices of the United States Government. The canal is a necessity of the age, and, were the cost double what I estimate it to be, the immense benefits certain to result would amply justify its execution. It will bind together the remote sections of that immense country, assimilate its diverse interests, go far towards

solving many difficult problems, and make the United States still more united.

Finally, I believe it will, taken in connection with the vast changes occurring in the Far East, bring about the most serious rivalry to the commercial supremacy of Great Britain which she has yet had to encounter.

APPENDICES.

APPENDIX I.

THE CLAYTON AND BULWER CONVENTION, OF THE 19TH APRIL, 1850, BETWEEN THE BRITISH AND AMERICAN GOVERNMENTS, CONCERNING CENTRAL AMERICA.

Convention between the United States of America and her Britannic Majesty, for Facilitating and Protecting the Construction of a Ship-canal between the Atlantic and Pacific Oceans, and for other purposes.

Concluded 19th April, 1850; ratified by the United States, 23rd May, 1850; exchanged, 4th July, 1850; and proclaimed by the United States, 5th July, 1850.

By the President of the United States of America.

A Proclamation.

Whereas a convention between the United States of America and her Britannic Majesty, for facilitating and protecting the construction of a ship-canal between the Atlantic and Pacific oceans, and for other purposes, was concluded and signed at Washington on the 19th day of April last, which convention is, word for word, as follows:—

Convention between the United States of America and Her Britannic Majesty.

The United States of America and her Britannic Majesty, being desirous of consolidating the relations of amity which so happily subsist between them, by setting forth and fixing in a convention their views and intentions with reference to any means of communication by ship-canal which may be constructed between the Atlantic and Pacific oceans, by the way of the river San Juan de Nicaragua, and either or both of the lakes of Nicaragua or Managua, to any port or place on the

Pacific ocean; the President of the United States has conferred full powers on John M. Clayton, Secretary of State of the United States; and her Britannic Majesty on the Right Honourable Sir Henry Lytton-Bulwer, a member of her Majesty's most honourable Privy Council, Knight Commander of the most honourable Order of the Bath, envoy extraordinary and minister plenipotentiary of her Britannic Majesty to the United States, for the aforesaid purpose: and the said plenipotentiaries having exchanged their full powers, which were found to be in proper form, have agreed to the following Articles :—

ARTICLE I.

The governments of the United States and Great Britain hereby declare that neither the one nor the other will ever obtain or maintain for itself any exclusive control over the said ship-canal; agreeing that neither will ever erect or maintain any fortifications commanding the same, or in the vicinity thereof, or occupy, or fortify, or colonize, or assume or exercise any dominion over, Nicaragua, Costa Rica, the Mosquito coast, or any part of Central America; nor will either make use of any protection which either affords, or may afford, or any alliance which either has, or may have, to or with any state or people, for the purpose of erecting or maintaining any such fortifications, or of occupying, fortifying, or colonizing Nicaragua, Costa Rica, the Mosquito coast, or any part of Central America, or of assuming or exercising dominion over the same; nor will the United States or Great Britian take advantage of any intimacy, or use any alliance, connection, or influence that either may possess with any state or government through whose territory the said canal may pass, for the purpose of acquiring or holding, directly or indirectly, for the citizens or subjects of the one, any rights or advantages in regard to commerce or navigation through the said canal, which shall not be offered on the same terms to the citizens or subjects of the other.

ARTICLE II.

Vessels of the United States or Great Britain traversing the said canal shall, in case of war between the contracting parties, be exempted from blockade, detention, or capture by either of the belligerents; and this provision shall extend to such a distance from the two ends of the said canal as may hereafter be found expedient to establish.

ARTICLE III.

In order to secure the construction of the said canal, the contracting parties engage that if any such canal shall be undertaken upon fair and equitable terms by any parties having the authority of the local government or governments through whose territory the same may pass, then the persons employed in making the said canal, and their property used, or to be used, for that object, shall be protected from the commencement of the said canal to its completion, by the governments of the United States and Great Britain, from unjust detention, confiscation, seizure, or any violence whatsoever.

ARTICLE IV.

The contracting parties will use whatever influence they respectively exercise with any state, states, or governments possessing, or claiming to possess, any jurisdiction or right over the territory which the said canal shall traverse, or which shall be near the waters applicable thereto, in order to induce such states or governments to facilitate the construction of the said canal by every means in their power. And furthermore, the United States and Great Britain agree to use their good office wherever or however it may be most expedient, in order to procure the establishment of two free ports, one at each end of the said canal.

ARTICLE V.

The contracting parties further engage, that when the said canal shall have been completed, they will protect it from interruption, seizure, or unjust confiscation, and that they will guarantee the neutrality thereof, so that the said canal may for ever be open and free, and the capital invested therein secure. Nevertheless, the governments of the United States and Great Britain, in according their protection to the construction of the said canal, and guarantying its neutrality and security when completed, always understand that this protection and guaranty are granted conditionally, and may be withdrawn by both governments, or either government, if both governments, or either government, should deem that the persons or company undertaking or managing the same adopt or establish such regulations concerning the traffic thereupon as are contrary to the spirit and intention of this convention, either by making unfair discriminations in favour of the commerce of one of the contracting parties over the commerce of the other, or by imposing oppressive exactions or unreasonable tolls upon

passengers, vessels, goods, wares, merchandise, or other articles. Neither party, however, shall withdraw the aforesaid protection and guaranty without first giving six months' notice to the other.

ARTICLE VI.

The contracting parties in this convention engage to invite every State with which both or either have friendly intercourse to enter into stipulations with them similar to those which they have entered into with each other, to the end that all other States may share in the honour and advantage of having contributed to a work of such general interest and importance as the canal herein contemplated. And the contracting parties likewise agree that each shall enter into treaty stipulations with such of the Central American States as they may deem advisable, for the purpose of more effectually carrying out the great design of this convention—namely, that of constructing and maintaining the said canal as a ship communication between the two oceans for the benefit of mankind, on equal terms to all, and of protecting the same; and they also agree that the good offices of either shall be employed, when requested by the other, in aiding and assisting the negotiation of such treaty stipulations; and should any differences arise as to right or property over the territory through which the said canal shall pass between the states or governments of Central America, and such differences should in any way impede or obstruct the execution of the said canal, the governments of the United States and Great Britain will use their good offices to settle such differences in the manner best suited to promote the interests of the said canal, and to strengthen the bonds of friendship and alliance which exist between the contracting parties.

ARTICLE VII.

It being desirable that no time should be unnecessarily lost in commencing and constructing the said canal, the governments of the United States and Great Britain determine to give their support and encouragement to such persons or company as may first offer to commence the same, with the necessary capital, the consent of the local authorities, and on such principles as accord with the spirit and intention of this convention; and if any persons or company should already have, with any State through which the proposed ship-canal may pass, a contract for the construction of such a canal as that specified in this convention, to the stipulations of which contract neither of the contracting parties in this convention have any just cause to object, and the

said persons or company shall, moreover, have made preparations, and expended time, money, and trouble, on the faith of such contract, it is hereby agreed that such persons or company shall have a priority of claim, over every other person, persons, or company, to the protection of the governments of the United States and Great Britain, and be allowed a year from the date of the exchange of the ratifications of this convention for concluding their arrangements, and presenting evidence of sufficient capital subscribed to accomplish the contemplated undertaking; it being understood that if, at the expiration of the aforesaid period, such persons or company be not able to commence and carry out the proposed enterprise, then the governments of the United States and Great Britain shall be free to afford their protection to any other persons or company that shall be prepared to commence and proceed with the construction of the canal in question.

ARTICLE VIII.

The governments of the United States and Great Britain having not only desired, in entering into this convention, to accomplish a particular object, but also to establish a general principle, they hereby agree to extend their protection, by treaty stipulations, to any other practicable communications, whether by canal or railway, across the isthmus which connects North and South America, and especially to the inter-oceanic communications, should the same prove to be practicable, whether by canal or railway, which are now proposed to be established by the way to Tehuantepec or Panama. In granting, however, their joint protection to any such canals or railways as are by this article specified, it is always understood by the United States and Great Britain that the parties constructing or owning the same shall impose no other charges or conditions of traffic thereupon than the aforesaid governments shall approve of as just and equitable; and that the same canals or railways being open to the citizens and subjects of the United States and Great Britain on equal terms shall also be open on like terms to the citizens and subjects of every other State which is willing to grant thereto such protection as the United States and Great Britain engage to afford.

ARTICLE IX.

The ratifications of this convention shall be exchanged at Washington within six months from this day, or sooner if possible.

In faith whereof, we, the respective plenipotentiaries, have signed this convention, and have hereunto affixed our seals.

Done at Washington the nineteenth of April, Anno Domini, One thousand eight hundred and fifty.

JOHN M. CLAYTON. (L. S.)
HENRY LYTTON BULWER. (L. S.)

And whereas the said convention has been duly ratified on both parts, and the respective ratifications of the same were exchanged at Washington on the 4th instant, by John M. Clayton, Secretary of State of the United States, and the Right Honourable Sir Henry Lytton Bulwer, Envoy Extraordinary and Minister Plenipotentiary of Her Britannic Majesty, on the part of their respective governments:

Now, therefore, be it known, that I, ZACHARY TAYLOR, President of the United States of America, have caused the said convention to be made public, to the end that the same and every clause and article thereof may be observed and fulfilled with good faith by the United States and the citizens thereof. In witness whereof I have hereunto set my hand, and caused the seal of the United States to be affixed.

Done at the city of Washington, this fifth day of July, in the year of our Lord, One thousand eight hundred and fifty, and (L. S.) of the independence of the United States the seventy-fifth.

Z. TAYLOR.

By the President:
J. M. Clayton, Secretary of State.

APPENDIX II.

DICKINSON-AYON TREATY OF FRIENDSHIP, COMMERCE AND NAVIGATION.

Concluded June 21st, 1867; ratifications exchanged at Granada, June 20th, 1868; proclaimed August 13th, 1868.

The United States of America and the Republic of Nicaragua, desiring to maintain and to improve the good understanding and the friendly relations which now happily exist between them, to promote the commerce of their citizens, and to make some mutual arrangement with respect to a communication between the Atlantic and Pacific oceans by the river San Juan, and either or both the lakes of Nicaragua and Managua, or by any other route through the territories of Nicaragua, have agreed, for this purpose, to conclude a treaty of friendship, commerce and navigation, and have accordingly named as their respective plenipotentiaries, that is to say:

The President of the United States, Andrew B. Dickinson, Minister Resident and Extraordinary to Nicaragua; and his Excellency, the President of the Republic of Nicaragua, Señor Licenciado Don Tomás Ayon, Minister of Foreign Relations:

Who, after communicating to each other their full powers, found in due and proper form, have agreed upon the following articles:

Article I.

DECLARATION OF AMITY.

There shall be perpetual amity between the United States and their citizens on the one part, and the Government of the Republic of Nicaragua and its citizens on the other.

Article II.

Freedom of commerce.
Coasting trade.

ARTICLE III.

Most favoured nations.

ARTICLE IV.

No discrimination in duties and charges on exports and imports.

ARTICLE V.

No discrimination in tonnage duties.

ARTICLE VI.

No discrimination in duties on vessels.

ARTICLE VII.

Privileges of citizens of one nation in the territory of the other in business affairs.

Protection to persons and property.

ARTICLE VIII.

Privileges of citizens of one nation in the territory of the other.

Real estate.

Estates of deceased persons.

ARTICLE IX.

Intermarriage and holding property not to change national character.

Exemption from military service and contributions.

Property not to be taken without compensation.

Freedom of travel and intercourse.

ARTICLE X.

Consuls.

Most favoured nation privileges accorded to Consuls.

Diplomatic agents and Consuls.

ARTICLE XI.

In case of unfriendly relation, citizens may remove property.

ARTICLE XII.

Privileges of citizens of one nation in the territory of the other.

ARTICLE XIII.

Refuge and asylum.

NOTE.—As Articles II. to XIII. inclusive of this treaty have no direct bearing upon the canal enterprise, their subjects only are here mentioned. See "Treaties and Conventions Concluded Between the United States of America and Foreign Powers," Government Printing Office, Washington, 1889.

ARTICLE XIV.

The Republic of Nicaragua hereby grants to the United States, and to their citizens and property, the right of transit between the Atlantic and Pacific Oceans through the territory of that republic, on any route of communication, natural or artificial, whether by land or by water, which may now or hereafter exist or be constructed under the authority of Nicaragua, to be used and enjoyed in the same manner and upon equal terms, by both republics and their respective citizens, the Republic of Nicaragua, however, reserving its rights of sovereignty over the same.

ARTICLE XV.

The United States hereby agree to extend their protection to all such routes of communication as aforesaid, and to guarantee the neutrality and innocent use of the same. They also agree to employ their influence with other nations to induce them to guarantee such neutrality and protection.

And the Republic of Nicaragua, on its part, undertakes to establish one free port at each extremity of one of the aforesaid routes of communication between the Atlantic and Pacific Oceans. At these ports no tonnage or other duties shall be imposed or levied by the Government of Nicaragua on the vessels of the United States, or on any effects or merchandise belonging to citizens or subjects of the United States, or upon the vessels or effects of any other country intended, bonâ fide, for transit across the said routes of communication, and not for consumption within the Republic of Nicaragua. The United States shall also be at liberty, on giving notice to the government or authorities of Nicaragua, to carry troops and munitions of war in their own vessels, or otherwise, to either of said free ports, and shall be entitled to their conveyance between them without obstruction by said government or authorities, and without any charges or tolls whatever for their transportation on either of said routes: *Provided*, said troops and munitions of war are not intended to be employed against Central American nations friendly to Nicaragua.

And no higher or other charges or tolls shall be imposed on the conveyance or transit of persons and property of citizens or subjects of the United States, or of any other country, across the said routes of communication, than are or may be imposed on the persons and property of citizens of Nicaragua.

And the Republic of Nicaragua concedes the right of the Postmaster-General of the United States to enter into contracts with any individuals or companies to transport the mails of the United States along the said routes of communication, or along any other routes across the isthmus, in its discretion, in closed bags, the contents of which may not be intended for distribution within the said republic, free from the imposition of all taxes or duties by the Government of Nicaragua; but this liberty is not to be construed so as to permit such individuals or companies, by virtue of this right to transport the mails, to carry also passengers or freight.

ARTICLE XVI.

The Republic of Nicaragua agrees that, should it become necessary at any time to employ military forces for the security and protection of persons and property passing over any of the routes aforesaid, it will employ the requisite force for that purpose; but, upon failure to do this from any cause whatever, the Government of the United States may, with the consent or at the request of the Government of Nicaragua, or of the minister thereof at Washington, or of the competent legally appointed local authorities, civil or military, employ such force for this and for no other purpose; and when, in the opinion of the Government of Nicaragua, the necessity ceases, such force shall be immediately withdrawn.

In the exceptional case, however, of unforeseen or imminent danger to the lives or property of citizens of the United States, the forces of said republic are authorized to act for their protection without such consent having been previously obtained.

But no duty or power imposed upon or conceded to the United States by the provisions of this article shall be performed or exercised except by authority and in pursuance of laws of Congress hereafter enacted. It being understood that such laws shall not affect the protection and guarantee of the neutrality of the routes of transit, nor the obligation to withdraw the troops which may be disembarked in Nicaragua directly that, in the judgment of the government of the republic, they should no longer be necessary, nor in any manner bring about new obligations on Nicaragua, nor alter her rights in virtue of the present treaty.

ARTICLE XVII.

It is understood, however, that the United States, in according protection to such routes of communication, and guaranteeing their neutrality and security, always intend that the protection and guarantee are granted conditionally, and may be withdrawn if the United States should deem that the persons or company undertaking or managing the same adopt or establish such regulations concerning the traffic thereupon as are contrary to the spirit and intention of this treaty, either by making unfair discriminations in favour of the commerce of any country or countries over the commerce of any other country or countries, or by imposing oppressive exactions or unreasonable tolls upon mails, passengers, vessels, goods, wares, merchandise, or other articles. The aforesaid protection and guarantee shall not, however, be withdrawn by the United States without first giving six months' notice to the Republic of Nicaragua.

ARTICLE XVIII.

And it is further agreed and understood that in any grants or contracts which may hereafter be made or entered into by the Governments of Nicaragua, having reference to the inter-oceanic routes above referred to, or either of them, the rights and privileges granted by this treaty to the government and citizens of the United States shall be fully protected and reserved. And if any such grants or contracts now exist, of a valid character, it is further understood that the guarantee and protection of the United States, stipulated in Article XV. of this treaty, shall be held inoperative and void until the holders of such grants and contracts shall recognize the concessions made in this treaty to the government and citizens of the United States with respect to such inter-oceanic routes, or either of them, and shall agree to observe and be governed by these concessions as fully as if they had been embraced in their original grants or contracts; after which recognition and agreement said guarantee and protection shall be in full force: provided, that nothing herein contained shall be construed either to affirm or to deny the validity of the said contracts.

ARTICLE XIX.

After ten years from the completion of a railroad, or any other route of communication through the territory of Nicaragua from the Atlantic to the Pacific Ocean, no Company which may have constructed or be in

possession of the same, shall ever divide directly or indirectly, by the issue of new stock, the payment of dividends or otherwise, more than fifteen per cent. per annum, or at that rate to its stockholders from tolls collected thereupon; but whenever the tolls shall be found to yield a larger profit than this, they shall be reduced to the standard of fifteen per cent. per annum.

Article XX.

DURATION OF TREATY.

The two high contracting parties, desiring to make this treaty as durable as possible, agree that this treaty shall remain in full force for the term of fifteen years from the day of the exchange of the ratifications; and either party shall have the right to notify the other of its intention to terminate, alter, or reform this treaty, at least twelve months before the expiration of the fifteen years; if no such notice be given, then this treaty shall continue binding beyond the said time, and until twelve months shall have elapsed from the day on which one of the parties shall notify the other of its intention to alter, reform, or abrogate this treaty.

Article XXI.

RATIFICATIONS.

The present treaty shall be ratified, and the ratifications exchanged at the City of Managua within one year, or sooner, if possible.

In faith whereof the respective plenipotentiaries have signed the same, and affixed thereto their respective seals.

Done at the City of Managua, this twenty-first day of June, in the year of our Lord one thousand eight hundred and sixty-seven.

(Seal) A. B. DICKINSON.
(Seal) TOMAS AYON.

APPENDIX III.

TREATY[1] — FRELINGHUYSEN-ZAVALA (UNRATIFIED) — PROVIDING FOR THE CONSTRUCTION OF AN INTER-OCEANIC CANAL ACROSS THE TERRITORY OF NICARAGUA.

The United States of America and the Republic of Nicaragua, recognizing the importance of an inter-oceanic communication across the Isthmus at Nicaragua, which shall bring into close communication the ports of North and South America, and shall facilitate commerce between Europe and the ports of the Pacific, between the Eastern parts of Asia and the Atlantic seaboard, and the ports of the United States on the Pacific and Atlantic, have agreed for this purpose to build a canal, and to that end to conclude a treaty, and have accordingly named as their respective plenipotentiaries the President of the United States, Frederick T. Frelinghuysen, Secretary of State of the United States of America, and the President of Nicaragua, General Joaquin Zavala, ex-President of the Republic of Nicaragua, who, after communicating to each other their full powers, found in due and proper form, have agreed upon the following articles:

Article I.

The canal shall be built by the United States of America, and owned by them and the Republic of Nicaragua, and managed as hereinafter provided.

Article II.

There shall be perpetual alliance between the United States of America and the Republic of Nicaragua, and the former agree to protect the integrity of the territory of the latter.

[1] This treaty has never been officially published. It is reprinted from the *New York Tribune* of December 18th, 1884.

Article III.

FULL POWERS GIVEN TO THE UNITED STATES.

A practicable ship canal for vessels of the largest size commonly used in commerce, shall be begun by the United States, and be prosecuted to as speedy conclusion as circumstances may permit, subject to the limitation provided in Article XX. of this convention. This canal shall follow what may be decided to be the most available route from ocean to ocean, and the United States, in building the canal, shall enjoy the fullest liberty in its construction and in its location, and that of its dependencies, accessories and works, as well as in the selection of entrance ports, should it be found necessary or desirable to leave the bed of the San Juan river at any point, and to construct a lateral canal. The Government of Nicaragua reserves the right to require the establishment of a lock communication for vessels of six feet draft, and 160 feet length, between the lower part of the river and that part used for the canals, but the Government of Nicaragua will advise the United States of its wishes in this regard as soon as work shall be begun in the river; and it is expressly stipulated that Nicaragua alone shall be responsible for the maintenance and operation of this communication, and for the navigable condition of the lower river.

Article IV.

For the purpose of carrying out this agreement, the Republic of Nicaragua agrees to give the United States free use of Lake Nicaragua; to furnish, free of cost, all the spaces necessary to the construction, maintenance, use, and enjoyment of the canal and for any probable future enlargement thereof, whether these spaces be upon the dry land, in the lakes and upon their islands, in the rivers and upon their islands, or at the ports and roadsteads of the two oceans, together with their surroundings and declivities, and all the spaces required for the deposit of material from excavations and cuttings, from the overflows arising from dams in the rivers, for all deviations of streams from their channels, as well as for reservoirs, dikes, piers, docks, spaces about locks, for lights, beacons, storehouses, machine shops, buildings, and for whatever other thing necessary, and, in short, all lands, waters and places within the Republic of Nicaragua required for the construction, maintenance, use and business of the canal, including a railway from one terminal of the canal to the other, substantially parallel to and near the bank of the

canal and along the southern shore of Lake Nicaragua, together with a telegraph line, should the United States decide to construct either said railway or telegraph line, or both, which shall be regarded for all purposes of this treaty as part of the canal so long as they are maintained.

ARTICLE V.

The work shall be declared one of public utility, and for the purposes of building and operating the canal, railway and telegraph line the Republic of Nicaragua undertakes to expropriate lands belonging to individuals. Any private property and real estate actually held by individuals or corporations which shall be taken or used by the United States for the construction of the canal or its accessories, or for their maintenance, shall be so taken upon condemnation and appraisement of the value of such property, and the Government of the United States will pay to the owners thereof the value fixed by a commission of assessors, comprising three members, one of whom shall be appointed by the President of the United States, one by the President of Nicaragua, and the third to be chosen by these two jointly. The United States or the Board of Managers hereafter provided for, as the case may be, shall have the right to take from the public lands of Nicaragua any materials whatever needed for the construction, preservation, maintenance, and use of the canal and of its ports, dependencies, accessories and equipments. When the materials are taken from private lands the United States, or the said Board of Managers, shall enjoy in their use all the rights the Republic of Nicaragua enjoys by law and usage. As to the contract of the Government of Nicaragua with Mr. F. A. Pellas relating to steam navigation, that government engages that said contract shall not be considered applicable to the necessary operations of either party to this convention in constructing or operating the canal or any part of it during the time the contract has yet to run, this exemption to include necessary canal work and transportation on Lake Nicaragua and the rivers of the republic. Further, the said Government of Nicaragua agrees that, should the Government of the United States during the period the said contract has yet to run find it advisable to purchase the franchise, property and rights now held by said Pellas by virtue of said contract, the said franchise, property and rights shall be expropriated by the same form and under the same conditions as are fixed in this article for the expropriation of other private property. Should the United States, in the construction of the said works, find it necessary to occupy any lands belonging to the Republic, they shall have the right to do so

free of charge during such temporary occupation, and the land so occupied, if sold or otherwise alienated, shall be conveyed with the reservation of this temporary right of occupation by the United States.

Article VI.

The United States shall have the right throughout the extent of the canal, and of its accessories, dependencies and adjuncts, as well as its mouths at both oceans, and in the lake and river which the canal route may traverse, and that may be used in any manner in connection with the canal construction, to enter upon work of any kind whatsoever deemed necessary by the engineers for the construction of a safe, effective, durable and speedy route for the transit of vessels from ocean to ocean without let or hindrance of any kind from the government or people of the Republic of Nicaragua, and also for the construction of the said railway and telegraph line.

Article VII.

SETTING ASIDE LANDS.

A strip of territory two and one-half English miles in width, the middle of the strip to coincide with the centre line of the canal, and also a strip two and one-half miles wide around the southern end of the lake where the lake is used as a water-course for the canal, as well as a strip two and one-half miles wide along the river, where the river is used as a part of the canal, shall be set aside for the work and owned by the two contracting parties, and where the railway and telegraph line aforesaid may of necessity pass beyond the bounds of such strip of land a plot one-half of a mile in width, whose centre line shall coincide with the railway outside of the belt reserved for the canal shall also be set aside and owned, and all the land in this Article referred to shall be subject to the agreement hereinbefore made as to lands, when owned by the State or by private individuals, necessarily used in the prosecution of the work; but the said lands in this Article described shall not include towns, villages or cities now in existence. In such case, only that part shall be considered as embraced in this Article as is absolutely essential to the economical prosecution or administration of the work over these strips. In time of peace, Nicaragua shall exercise civil jurisdiction, and its inhabitants shall not in any way be considered as impaired in their rights as citizens of the republic.

Article VIII.

PROVISIONS AS TO VESSELS AND THEIR CARGOES.

No Custom House tolls, or other taxes or impositions of any sort or kind, shall be levied by the Government of Nicaragua upon any vessels passing the canal, their cargoes, stores, passengers, crews or baggage, or for unloading, loading, docking or repairing vessels, it being the intent of this agreement that vessels, their cargoes and passengers and crew shall pass the canal free of any charge other than that imposed upon them by the two Governments, in their capacities as owners of the work. Nicaragua may, however, provide a police system along the line of canal to keep the peace and to prevent smuggling into her territory, the reasonable cost of which, as approved from time to time by the Board of Managers, shall be a charge upon the revenues of the canal. The Board of Managers shall have the right to discharge and reload ships in transit, at such points as may be convenient, in order to make repairs or to lighten the vessel, to ship cargo, by reason of any cause rendering any of these acts necessary, or may tranship cargo without being subject to search, actions, duties, or taxes of any kind, but before beginning such operations notice thereof must be given to the nearest customs authority.

Article IX.

The Government of the Republic of Nicaragua, in conformity with the laws, shall lend its protection to the engineers, contractors, agents, employés and labourers employed in the construction, maintenance and management of the canal and its accessories, and they shall be wholly exempt from military requisitions and forced loans; but if any such persons shall acquire real estate outside of the strips provided for in Article VIII. hereof, they shall be subject to the taxes fixed by law. The Government of Nicaragua guarantees to the canal and its accessories, and to its agents of all classes, security, under the laws of the country, against domestic acts of hostility in the same degree as in the case of other inhabitants, employing all its powers for their protection.

Article X.

FREE FROM TAXATION.

All contracts for the construction, maintenance and management of the canal and accessories may be enforced according to the laws of Nicaragua and the provisions of this convention.

Article XI.

The canal and its accessories and dependencies of every kind shall be exempt in peace and in war from every form of taxation upon real or personal property acquired in virtue of this convention, and from every form of direct or indirect taxation, contributions, local taxes or other dues in respect to the ownership and use of the canal and its accessories, or of the buildings or constructions or equipments or appliances appertaining thereto, or to the ports and maritime establishments thereof anywhere in the republic and upon the lands set aside for the purposes of the canal and its accessories. The Republic of Nicaragua binds itself not to establish tonnage dues, anchorage, light, wharf or pilot dues, or charges of any class whatsoever, upon vessels of whatever kind, or upon merchandise, or crews, or passengers, or gold, or silver, or diamonds, or anything traversing the canal, all such dues being for the benefit of the two governments in their capacity as joint owners and managers of the canal and its accessories; but merchandise, loaded or unloaded, in any part of the canal or its accessories, coming from or destined to Nicaragua and intended for sale, shall pay dues for exportation and importation fixed by the revenue laws of Nicaragua.

Article XII.

EXEMPTING MATERIALS FROM DUTY.

All articles necessary for the construction and repair of the canal and its accessories may be imported without duty or tax of any kind being laid thereon by the Government of Nicaragua, including such iron, steel, locomotives, cars, telegraph wires and instruments, tugs, dredges and vessels or other things as may at any time be used in the construction, improvement, prosecution or maintenance of the work, or in the maintenance or improvement of the same after its completion; and during the construction of the canal and its accessories, all supplies, whether personal or otherwise, except tobacco, spirits or wines, used by those engaged in the work, shall be free of any customs or other tax; but no such supplies shall be permitted to be sold to those not actually engaged in the work, or to be smuggled into or sold in the interior. All vessels in the service of the canal and its accessories, with their equipment and outfit, arriving at any port of Nicaragua from any point whatever, shall be free of all duties and port charges.

Article XIII.

For and in consideration of the preceding articles, the United States of America agree to furnish the money to build the said canal and its accessories, including, if found advisable, the said railway and telegraph lines, together with all docks, locks, machine shops, annexes, machinery, feeders, etc., it being the intent of this agreement that the United States of America shall build and complete the canal and everything appertaining thereto, for the safe and speedy passage of the vessels hereinbefore described, and for through communication between ocean and ocean, and such loading and repairing as may be necessary, at their sole cost and without expense to the Government of Nicaragua.

Article XIV.

EXCLUSIVE CONTROL GIVEN TO THE UNITED STATES.

The United States shall have exclusive control of the construction of the canal and railway and telegraph line, if the same be built, and shall be invested with all the rights and powers necessary thereto. The management, care, and protection of the canal and its accessories, including the said railway and telegraph line, if built under the general supervision of the two governments, shall be entrusted to a Board of Managers, which shall consist of six members, three of whom shall be appointed by the President of the United States by and with the advice and consent of the Senate thereof, should the Senate be in session; or, should the Senate not be in session, the three members shall be appointed by the President subject to confirmation by the Senate at its next session; and three by the Republic of Nicaragua. Any vacancy which may occur among the members of the board appointed by the President of the United States shall be filled by the said President in the manner provided in the United States for filling of vacant government offices; and any vacancy which may occur among the members of the board appointed by the President of Nicaragua shall be filled by the said President in the manner provided in Nicaragua for filling vacant government offices. This board shall be designated as soon as the canal is ready for traffic, and shall determine all questions by a majority vote. The chairman of the board shall be one of the members appointed by the President of the United States, and designated as chairman by him; and in case of a tie, the chairman shall have an additional vote. This board shall be entrusted with the general executive management of the canal and its accessories, including said railway and telegraph line when built, and of

all matters relating to the maintenance or improvement thereof; shall fix the tolls and provide rules and regulations for the management thereof. Their action shall be, however, at all times subject to a joint direction by the Presidents of the two Republics, which they shall be bound implicitly to obey. The said Board of Managers shall have the right and power to levy and collect for steamers, ships and vessels of every class entering the canal or the ports at the canal entrances, and for passengers, merchandise and cargo of all kinds, transit, navigation, tonnage, light and port dues, as well as for towage, storage, anchorage, wharfage and hospital dues, and all other like fees. The Government of Nicaragua guarantees the enforcement of the regulations so adopted by the Board of Managers as if issued by the Government of Nicaragua. The tolls hereinbefore provided, shall be equal as to vessels of the parties hereto, and of all nations, except that vessels entirely owned and commanded by citizens of either one of the parties to this convention and engaged in its coasting may be favoured. Nicaraguan vessels using a portion only of the canal shall pay proportionate tolls, and shall pay no tolls where the canal shall use any part of any existing navigable waterway.

Article XV.

The books and affairs of the said Board of Managers shall be subject to such inspection or examination as the President of either Republic shall at any time direct. The Board of Managers shall, on the first days of January, April, July and October in each and every year, make to the President of each Republic a full and complete report of their transactions during the preceding quarter, and the President of either Republic may at any time call upon them for such other or further information as he may deem expedient. The Board of Managers shall appoint and remove all officers engaged upon the canal and its accessories, including the railway and telegraph line, and may make regulations for the appointment and removal of all subordinate employés.

Article XVI.

how the revenues shall be used.

All the proceeds of the canal and its accessories, including the railway and telegraph line, shall be applied:

First.—To the maintenance and improvement, if found necessary, of the works, including the salaries of the Board of Managers and all officers and others employed.

Second.—The balance shall be paid to the two governments in the following proportions, viz.: To Nicaragua one-third, and to the United States two-thirds. Liquidation of the accounts of the Board of Managers and payment of the balances herein prescribed shall be effected quarterly on the first days of January, April, July and October in each and every year.

ARTICLE XVII.

The Government of Nicaragua grants to the United States during the construction of the canal and its accessories, and to the Board of Managers thereafter, the right to use any of the ports of the republic open to commerce as places of refuge for the vessels in the service of the canal and its accessories, or for any other vessels whatever having the right to pass the canal, and wishing to enter any of the said ports, and these vessels shall be free of all duties or charges of any kind on the part of the Republic of Nicaragua.

ARTICLE XVIII.

The United States frankly disavow any intention to in any way seek to impair the independent sovereignty of Nicaragua or to aggrandize themselves at the expense of that State or of any of her sister republics in Central America; but, on the contrary, desire to strengthen the power of free republics on this continent, and to promote and develop their prosperity and independence. Pursuant to this wish they have united with Nicaragua in the construction of this work which will be of advantage not only to the two nations most intimately concerned, but to all those with whom they are on terms of friendship.

ARTICLE XIX.

If, in virtue of any existing treaty between the Republic of Nicaragua and a third power, privileges or rights are stipulated in favour of such third power of an inter-oceanic transit way, which may not be compatible with the terms of the present convention, the Republic of Nicaragua engages to terminate such treaty in due form by giving to the said third power the stipulated notification within two months from the date of the exchange of the notification hereof; and if such treaty between Nicaragua and any third power contain no termination clause, the Republic of Nicaragua engages to procure its abrogation or modification so as not to conflict with the present compact, and the United States will use their good offices, if need be, to the end of effecting such abrogation or modification.

Article XX.

WHEN WORK ON THE CANAL WILL BE BEGUN.

The United States of America engage to begin effective work on the canal within two years from the exchange of ratifications of this treaty, and to complete the canal within ten years after beginning it, in default of which this treaty shall become inoperative, *Provided, however*, That should there arise insuperable obstacles to retard the work during this time it shall be prolonged in proportion to the time lost by reason of such obstacles; *And, Further*, if at the expiration of the said ten years the canal shall not be opened to commerce between the two oceans, then, in consideration of the large capital invested in the work, and of the good faith and ability shown as well as of the difficulties encountered, the Republic of Nicaragua binds itself to extend this period so far as is just and necessary.

Article XXI.

Any difficulties between the parties hereto shall be submitted to the arbitration of a friendly power, if one can be agreed upon, or, failing such agreement, each party shall request a friendly nation to name an arbitrator, and the arbitrators thus named shall select a third; the decision of the arbitrating power or a majority of the Board of Arbitrators, as the case may be, shall be final and conclusive.

Article XXII.

The United States will aid by their good offices, if desired, in securing the union of the five Central American Republics under one representative government, and the reorganization of the said republics in one nationality being accomplished, the Central American Republics shall have the same rights and bear the same obligations as Nicaragua has and bears by virtue of this treaty.

Article XXIII.

FINANCIAL AID FROM THE UNITED STATES.

It appearing that the financial condition of Nicaragua is prosperous, that the republic is without incumbrance of debt, and that the government finds it necessary to finish as soon as possible certain railways within the republic, to extend its telegraph line, and to improve the navigation of the River San Juan, which enterprises will be of aid to the canal and favourable to its speedy construction and successful operation,

the Government of the United States agrees to loan to the Government of Nicaragua the sum of $4,000,000, to be applied to the above enumerated projects. Of this amount $1,000,000 shall be paid in the City of Washington within ninety days after the exchange of the ratifications of this convention, and the remaining $3,000,000 in instalments of $500,000 each every six months thereafter until the amount shall have been paid, but the failure to pay any of these sums from accident or non-action of Congress at the exact dates herein specified, such payments being made thereafter in good faith, shall not be held as affecting in any way the other engagements of this convention.

The Government of Nicaragua agrees that the Government of the United States shall be credited with and receive the share of Nicaragua in the net revenues of the canal, to be applied to the payment of this loan until it shall have been entirely extinguished, with the interest thereon at three per centum per annum, from the dates when the several sums shall be received by Nicaragua, and the Republic of Nicaragua may vote yearly through its Congress an additional sum from the general revenues of the republic to be applied to the payment of this loan and to aid in its speedy extinguishment; and further, the Government of Nicaragua assuming the repayment of said loan, binds itself to consider it until extinguished together with the interest thereon, as hereinbefore provided, as a lien upon all rights of Nicaragua in the canal, its accessories and appliances, this lien to continue until the repayment of the sum so advanced with the interest, but the repayment is not to be exacted until ten years after the said canal shall have been completed, and opened to commerce.

Article XXIV.

Neither of the parties to this convention shall sell, assign or otherwise alienate or suffer itself to be deprived of its or any part of its interest, right or property in or to the said canal, railway or telegraph line, should the same be built, or their or any other adjuncts or accessories, or any of the works or establishments pertaining thereto without the consent of the other manifested by legislative enactment.

Article XXV.

Ratification of the treaty.

This treaty is concluded subject to ratification by the proper constitutional authority of each party hereto, and to the legislation by the

appropriate legislative bodies of each, which is necessary to carry it into effect. It shall be ratified as soon as possible, but within two years from this date, and the ratifications thereof shall be exchanged in the city of Washington within six months from the approval by the said legislative bodies of Nicaragua and of the United States of the present treaty. *In testimony whereof* the undersigned plenipotentiaries have hereunto affixed their hands and seals. Done in duplicate in the English and Spanish languages, in Washington this first day of December, in the year of our Lord, one thousand eight hundred and eighty-four.

FRED'K T. FRELINGHUYSEN. (Seal)
JOAQ'N ZAVALA. (Seal)

APPENDIX IV.

CONCESSIONS AND DECREES OF THE REPUBLIC OF NICARAGUA TO THE NICARAGUA CANAL ASSOCIATION.

The President of the Republic to the Inhabitants thereof:

KNOW YE That Congress has ordered as follows:

The Senate and Chamber of Deputies of the Republic of Nicaragua do hereby

DECREE.

ONLY ARTICLE.—The contract for a maritime inter-oceanic canal entered into the 23d of March, ult., between Dr. Adan Cárdenas, commissioned especially by the supreme government, and Mr. A. G. Menocal, member and representative of the Nicaragua Canal Association organized in New York, is hereby ratified. This contract shall be a law of the Republic if Mr. Menocal accepts it as soon as he be notified, with the following modifications and upon the following terms:

"The undersigned, Adan Cárdenas, Commissioner of the Government of the Republic, party of the first part, and Aniceto G. Menocal, representative of the Nicaragua Canal Association, party of the second part, both having sufficient powers, have entered into the following contract for the excavation of an inter-oceanic canal through the territory of Nicaragua.

ARTICLE I.

The Republic of Nicaragua grants to the aforesaid Nicaragua Canal Association, and Mr. A. G. Menocal, representative of the said association, accepts on its behalf, for the purposes set forth in Article VII., the exclusive privilege to excavate and operate a maritime canal across its territory, between the Atlantic and Pacific Oceans.

ARTICLE II.

The canal shall be of sufficient dimensions for the free and commodious passage of vessels of the same size as the large steamers used for ocean navigation in Europe and America, provided that no locks used in said work shall be less than five hundred and fifty (550) feet in length and thirty feet in depth.

ARTICLE III.

The State declares this work to be one of public utility.

ARTICLE IV.

The duration of the present privilege shall be for ninety-nine (99) years, to be counted from the day the canal shall be opened to universal traffic. During the aforesaid period the company shall have the right to construct and operate a railway along the whole extent of the canal, or those parts of the same that may be considered convenient for the better service and operation of the said work.

ARTICLE V.

The State binds itself not to make any subsequent concession for the opening of a canal between the two oceans during the term of the present concession, and also to abstain from granting a concession for a railroad, such as might compete with the canal for the transportation of merchandise, during the same period; but nothing in this article shall prevent the Government of Nicaragua from constructing or permitting the construction of such railways as it may deem advisable for commerce and internal traffic. Said government also to have the right to construct or permit the construction of an inter-oceanic railway if, in course of time, it be demonstrated that the canal is not sufficient to satisfy the demands of the traffic of all nations.

The grantee company shall have the right to establish such telegraph lines as it may deem necessary for the construction, management and operation of the canal. The government shall have the right to occupy these lines for the public service without any remuneration to the company.

ARTICLE VI.

The Government of the Republic declares during the term of this concession the ports at each extremity of the canal, and the canal itself,

from sea to sea to be neutral, and that consequently the transit through the canal in case of war between two powers, or between one or more and Nicaragua, shall not be interrupted for such cause; and that merchant vessels and individuals of all nations of the world may freely enter the ports and pass through the canal without molestation or detention.

In general, all vessels may pass through the canal freely, without distinction, exclusion or preference of persons or nationality, provided they pay the dues and observe the regulations established by the grantee company, for the use of the said canal and its dependencies. The transit of foreign troops and vessels of war will be subjected to the prescriptions relating to the same established by treaties between Nicaragua and other powers, or by international law. But entrance to the canal will be vigorously prohibited to vessels of war of such powers as may be at war with Nicaragua or with any other of the Central American Republics.

Nicaragua will endeavour to obtain from the powers that are to guarantee the neutrality, that in the treaties that shall be made for that purpose, they shall agree also to guarantee a zone of land parallel to the canal and also a maritime zone in both oceans, the dimensions of which will be determined in such treaties.

Article VII.

This present agreement, with all its charges and advantages, shall be the object of a company of execution in agreement with Articles I., X., and those following thereafter.

Said company shall be the grantee, and whenever said name is used, in this present contract, reference is made to it.

Article VIII.

The present concession is transferable only to such company of execution as shall be organized by the Nicaragua Canal Association, and in no case to governments or to foreign public powers. Nor shall the company cede to any foreign government any part of the lands granted to it by this contract; but it may make transfers to private parties under the same restriction.

The Republic of Nicaragua cannot transfer its rights or shares by selling them to any government.

ARTICLE IX.

The people of all nations shall be invited to contribute the necessary capital to the enterprise, and it shall be sufficient for the fulfilment of this requirement to publish an advertisement for thirty (30) consecutive days in one of the principal daily papers of each of the cities, New York, London and Paris.

The capital stock of the final company shall be composed of shares, bonds or obligations of any other kind, in such proportion as it may deem convenient. The issue and transfer of these obligations shall be exempt from stamp dues, and from any other imposts or taxes established or that may be hereafter established in the Republic.

Of the capital with which the company shall organize, and which it proposes to distribute among the different countries interested in the enterprise, there shall be reserved at least five (5) per cent. for the Central American Governments and citizens that may desire to subscribe.

As soon as the company is ready to open subscription books it shall advise the Government of Nicaragua, which will invite the other governments, and through them private parties, to subscribe. All such shares not taken within six months following the date on which the government shall have been advised of that circumstance, shall remain subject to the free disposition of the company.

ARTICLE X.

The company shall be organized in the manner and under the conditions generally adopted for such companies. Its principal office shall be in New York, or where it may be deemed most convenient, and it may have branch offices in the different countries of Europe and America, where it may consider it expedient.

Its name shall be the "Maritime Canal Company of Nicaragua," and its Board of Directors shall be composed of persons one half at least of whom shall be chosen from the promoters who may yet preserve their quality as such.

ARTICLE XI.

The Government of Nicaragua in its character of shareholder in the company of execution, as hereinafter provided, shall have the perpetual right of naming one director, who shall be an integral part of the Board of Directors of the company, with all the rights, privileges and advantages

conferred upon them by the statutes of the company and the laws of the country under which it shall organize.

The government shall also have the right in its aforesaid capacity of shareholder to take part in such elections as the company may hold.

ARTICLE XII.

The company is bound to keep a representative in Nicaragua vested with all powers necessary for the proper conduct of the service and for the transaction of its business with the government.

ARTICLE XIII.

The canal will follow the valley of the River San Juan to Lake Nicaragua, through which will be designated the most convenient route for communication with the Pacific Ocean. In any event the company shall have the most ample freedom to select the route which it considers most convenient between the two oceans for the excavation of the canal and its dependencies and its ports, particularly those serving for entrance and exit on both oceans. The company shall have the same liberty to adopt the route which may be deemed most advantageous and economical for the construction of the canal, after the final survey by a commission of competent engineers.

However, should the company, after the survey of the River San Juan, find it necessary to abandon, in any place, the bed of the river, and cut a lateral canal, the Government of Nicaragua reserves the right of requiring from the company the duty of establishing a communication between the part of San Juan not used for canal purposes, and the dividing level of the canal, by means of a lock, or a series of locks, suitable for the navigation of ships of six feet draft. As soon as the final plans are adopted and laid before the government, it shall notify the company within one month after their receipt whether or not they meet with its approval, in order that the company may proceed in accordance therewith. It is understood that this duty does not in any manner compel the company to place or to maintain in navigable condition for small craft the lower part of the river which these locks may be intended to place in communication with the canal.

ARTICLE XIV.

Within three years, to be counted from the commencement of the work upon the Inter-oceanic Canal, the company shall, at its own expense, construct a navigable canal between Lake Managua and the

navigable part of the Tipitapa river, near Pasquier, of sufficient dimensions to admit of the free passage of vessels drawing six feet and of 150 feet in length. When completed, this canal shall be taken possession of by the Government of Nicaragua, and will be, after that date, the property of the Republic which, by virtue of its ownership, shall be bound to bear all expenses required in the future for the service, maintenance, repair and operation of the canal. But the company shall have the right to make use of it for all purposes useful for the maritime canal enterprise, and to pass through it freely with its vessels and those belonging to contractors employed in the service of the Inter-oceanic Canal during the term of this concession without being subject to any charge whatever, or to pay tolls or contributions of any kind to the Government of Nicaragua, or to any person or company that may, through any cause, be in charge of the administration and operation of the work and its dependencies.

The Government of Nicaragua will place at the disposal of the company, free of all expenses and charges, all the lands that may be required, as well as the materials found thereon, or on those belonging to the government and that may be utilized by the company in the execution of this work.

ARTICLE XV.

All expenditure for surveys, construction, maintenance and operation of the Inter-oceanic Maritime Canal shall be borne by the concessionary company, without any subvention in money or guaranty of interest on the part of the republic, nor other concessions than those specified in the present agreement.

ARTICLE XVI.

The company shall construct, at its expense, and maintain in good condition, two large ports, one in the Atlantic and one in the Pacific, to serve as termini of the canal, each of them to have a lighthouse of the first order. It shall also construct at the two points on the borders of the lake, where the canal disembogues, two ports of lesser size, with the respective lighthouses.

The company is also obliged to maintain and improve said ports by means of dredges, dikes, piers, embankments or any other works it may deem advisable, having always in view the good service of the traffic through the canal.

It may, for this purpose, select on the coasts of the two oceans,

within the territory of Nicaragua, the localities which the surveys may indicate as preferable.

ARTICLE XVII.

All the space necessary, whether on the main land, in the lake, and its islands at the ports, roadsteads or rivers of the two oceans for the establishment of the canal, its paths and embankments, for depositing the materials from the excavations and cuttings for the necessary spaces to be occupied by water after raising the dams which are to be constructed in the bed of the river, for all necessary deviations of streams, as well as for reservoirs, dikes, spaces about the locks, stations, lights and beacons, storehouses, buildings, and workshops, deposits for materials, and also all those spaces necessary for the routes, service railways and canals of the same nature for the transportation of the materials to the line of the work and for feeders for the canal; in short, all lands and places necessary to the construction and operation of the canal, as laid down in the drawings, and plans made by the engineers of the company, shall be placed at the disposal of the company by the State, under the conditions set forth in the following articles.

ARTICLE XVIII.

Said lands belonging to the State will be given to the company without any compensation whatever; and, with regard to those belonging to private parties, the State charges itself with their expropriation if the company so requests. The compensation which may be required in this case shall be paid by the company.

ARTICLE XIX.

In all relating to the expropriation that may be made in conformity with the preceding article, the company shall enjoy all the immunities and privileges which the laws of the country accord to the State; so that in no case shall the company be obliged to pay more than the State would under similar circumstances.

ARTICLE XX.

The government obliges itself to place the company, within six months after its request, in possession of up to one thousand (1,000) manzanas of land between the lake and the Pacific, at such places as the company shall designate, but they are to serve exclusively for cutting the canal, its havens, ports and other accessory works. The government

shall on its own account cause the necessary expropriation to be made, and the company shall pay to it for all indemnity the sum of fifty thousand dollars ($50,000) American gold. This payment to be made by the company in Managua within four months after the date of its request.

ARTICLE XXI.

The company shall have the right to take, free of charge, from the public lands for the purpose of construction, operation and maintenance of the canal, whatever materials may be found on them, especially timber for construction and for fuel, the lime, stone, clay for bricks and earth for fillings, as may be necessary. As regards materials found on private lands, the company shall pay for what it may need thereof, enjoying in this respect the same rights and privileges which the State enjoys according to law.

ARTICLE XXII.

Should the company require to occupy, temporarily, and during the construction of the canal, lands in the territory of Nicaragua which are not included in those designated in Articles 17, 18, and 21, it shall not be obliged to pay an indemnity for them if they are public lands; and the State shall not have the right to sell or dispose of them in any other manner after the company has determined to occupy them, unless under the reservation of this right, whose limit shall be the completion of the works on the inter-oceanic canal. Should the lands belong to private parties, the company shall enjoy, in regard to their temporary occupation, all the rights and privileges which the law accords to the State, with the special privilege of occupying them immediately after the declaration of necessity and utility, and after paying the compensation, which shall not exceed that which the State should be compelled to pay in a similar case.

ARTICLE XXIII.

The Republic of Nicaragua, desiring to assist the company efficaciously in the construction of the inter-oceanic canal, a work in which it takes the deepest interest, cedes in fee simple to the said company the public lands hereinafter mentioned, in alternate lots with other similar ones which it reserves to itself, and of the dimensions and in the places as specified hereinafter.

1st. On the left bank of the River San Juan, from the Atlantic to Castillo Viejo, lots of three miles frontage on the canal and six miles in

depth from the banks of the river. Where the canal diverges more than six miles from the banks of the river the lots are to be measured on both sides of it and shall be three miles wide and six miles deep. And where this distance is less than six miles the lots shall be three miles front and three miles deep, and they shall be measured from the bank of the canal to the river, taking what may be lacking from the opposite bank of the canal.

2nd. Three miles distance from Castillo up stream, on the right bank and up to the lake, lots of two miles in depth, and two of frontage on the canal. From the lake along its south shore to the river Sapoá and thence to the River Lajas, lots of one mile frontage and one mile depth. On the left bank of the river from a point in front of Castillo and up to the lake, lots of three miles of frontage on the canal and four miles in depth.

3rd. On the north shore of the lake as far as the River Tule, lots of two miles frontage on the lake and two miles deep.

4th. In the places which the company selects in accordance with the government, of the existing public lands, forty (40) lots, each four miles frontage by five miles deep, reserving always the acquired rights.

It is understood that the government reserves around each of the forts Castillo and San Carlos, the lands included in a circle of one and one-half ($1\frac{1}{2}$) miles radius, whose centre shall be the respective fortresses.

As a general rule, at the extremities of the inter-oceanic canal and at its points of contact with the lake, the opposite lots will be allotted one to the government and one to the company; but if this be not possible the first will belong to the government.

From the Atlantic to the lake, that part of the river bed occupied by the canal shall be considered as part of the latter for all purposes of this article.

The measurement and setting out of all lands ceded by this contract shall be made at the expense of the grantees under the supervision of the government.

The State shall vest in the company the possession of said lands so soon as the said company shall begin operations on the canal. Operations shall be regarded as begun when the provisions set forth in Article 47 shall have been complied with. The final deeds shall not be granted except as the work of the canal progresses and in due proportion.

ARTICLE XXIV.

In the unforeseen case that a new survey should show the necessity of adopting another line for the construction of the canal, which varies wholly or in part from the line set forth in Article 13, the company shall have the right to the lands and other elements necessary for the construction of the canal according to Articles 16, 17, 18, 19, 21 and 22.

The company shall, in that event, also have the right to the lands mentioned in the preceding article, in the same proportions, conditions and dimensions therein established with the single proviso that if it alter the line, the localities whence these lands shall be taken shall be altered accordingly.

ARTICLE XXV.

The State reserves the right to occupy, in the several lots of land granted the company, such places as it may need for such roads and public buildings as it may deem convenient. In the same manner it may use timber and other building materials found on such lands whenever they may be necessary for any work upon which it may determine. However, these lands, with all their products, vegetable and mineral, shall be subject to the laws of the country so soon as they become the property of individual citizens, by transfer from the company, and then, should the State need them for the ends set forth in this article, or for any others, it shall make compensation to their owners according to law, without any right on the part of the expropriated owners to reclaim against the company.

Should the company have improved the lands so taken for purposes of use, ornament or pleasure, the State shall be bound to reimburse it for such damages as it may have suffered, according to the assessment of experts.

ARTICLE XXVI.

Mines of coal, stone, gold, silver, iron or other metals situated in the lands granted to the company, shall belong to it by right, without need of previous "denunciation," it having the right to work them when considered expedient, subject to the laws of the country.

ARTICLE XXVII.

The company shall also have the right to utilize for its account, for sale or exportation, the lumber in the forests situated in the lands ceded

to it by the State, from the time they enter into possession of them in accordance with this contract; that is, from the time of commencement of the works, always saving the acquired rights.

ARTICLE XXVIII.

From the day on which the present concession is ratified by Congress, the public lands included in those necessary for the construction of the canal cannot be sold, nor can any of those ceded to the company on the banks of the canal, by Article 23. Nor can they be leased to the prejudice of the company.

ARTICLE XXIX.

The company shall have the right, throughout the extent of the canal as well as at its mouths on both oceans, and in the lake and throughout the extent of the lands ceded by virtue of Articles 16, 17, 22 and 23, to enter upon the work of locating, levelling, excavating, dredging, and in general any other work of whatsoever nature that may be judged useful for the establishment and feeding of the canal, or for its operation, preservation and maintenance. The company is specially authorized to execute along the canal line and on the banks of the River San Juan and its affluents, within the territory of Nicaragua, and also on the tributaries of Lake Nicaragua, the lakes or water-courses which can be utilized in their flow to the Pacific, the system of dikes, rectifications, dredgings, embankments, dams, cuts, location of buoys, and in general all the works that in the opinions of the engineers of the company are deemed indispensable for the construction, feeding, navigation and operation of the canal. The company may also do all works of like character deemed necessary at the entrances of the canal into Lake Nicaragua, as well as the lake itself, in accordance with the route that may be determined upon in order to secure in it easy navigation, and as may be found necessary in the other lakes or lagoons that are to be traversed.

The embankments, fillings and dikes formed in the mouths of the canal in the lake and in the ports on the oceans, by deposits of materials resulting from the excavations of the canal, shall belong in fee simple to the company; the government having the right to use them if necessary, after compensation made. But it may never obstruct said ports nor widen the beaches in front of them, unless there is absolute necessity to do so, and in this case the embankments and fillings that it may be necessary to construct in front of the ports shall belong to the Republic.

In general the company shall have the right to use all the lakes and

rivers of Nicaragua, the waters of which may be necessary, in the judgment of the engineers of the company, for the construction and supply of the canal and for maintaining its operations. It being understood that the damages caused to private parties by the deviation of the watercourses shall be compensated for by the company according to a just assessment by experts in agreement with the laws of the Republic.

ARTICLE XXX.

The company shall not import merchandise into the territory of the Republic for the purpose of trafficking without paying the import duties established by law. But it may import free of custom duties, and of any tax whatsoever, the articles needed for the works of the enterprise, such as surveys, examination of localities, construction, use, operation, maintenance, repairs and improvements of the canal; for the telegraphic service and for that of the railways; for running the workshops the company may keep in operation; and such articles may consist of tools, machinery apparatus, coal, limestone of all classes, lime, iron and other metals, raw or manufactured, mining powder, dynamite, or any other analogous substance. These articles may be transported between whatever points they may be required during the work of opening of the canal, and be discharged and stored free of all local taxes.

The company may import free of duties and taxes, during the work on the canal, provisions and medicines absolutely necessary for its own consumption. Goods, the commerce of which is not free, are excepted from the privileges contained in this article, which goods, excepting powder, dynamite and other explosives, remain subject to the requisites and duties prescribed by the laws.

ARTICLE XXXI.

The vessels employed by the company as tugboats or for the service of the canal shall be free from all duties and also the materials for their repair and the fuel they use. The vessels and appurtenances from whatever place they may be coming for the use of the company, shall also be exempt from all duties.

ARTICLE XXXII.

The government will establish such regulations as it may judge necessary to prevent smuggling and to maintain public order in the region of the canal.

The company is bound to lend its assistance for the enforcement of

such regulations. But in the free zone along the margin of the canal, as hereinafter provided, measures for the prevention of smuggling shall be limited to vigilance on the part of the employé or employés whom it may concern without any further measures being taken against passengers, vessels or their cargoes, excepting when an attempt at smuggling is discovered; it being the intention of the State that there should be the most ample liberty of transit by the canal for persons and property, with the sole limitations established by this contract. Consequently the company shall have the right to discharge and reload ships in transit at such points as may be necessary in order to make repairs, lighten the vessel, shift cargo, or on account of any accident that renders it absolutely necessary, without being subject to search, exactions or contributions of any kind, provided that in each case, and before beginning operations, the nearest custom house authority shall be notified.

ARTICLE XXXIII.

The government shall lend its protection, in conformity with the laws of the country, to the engineers, contractors, employés and labourers engaged in the preliminary surveys or in the works of construction and operation of the canal.

ARTICLE XXXIV.

The company shall be exempt from all forced loans and military exactions in time of peace and of war. The foreign agents and employés shall likewise be exempt from direct contributions, forced loans and military exactions during the time they are in the service of the canal, but they shall pay the taxes established by the laws, if they acquire real property.

ARTICLE XXXV.

The company may freely introduce immigrants into the lands ceded to it, and the employés and workmen needed in its works and workshops. Asiatics, however, are excepted. Both the immigrants and the employés and workmen will be subject to the laws of the Republic and the regulations of the company. The government assures them aid and protection, and the enjoyment of their rights and guarantees in conformity with the constitution and the national laws during the time they remain on Nicaraguan territory.

ARTICLE XXXVI.

The Government of Nicaragua assures to the company and its agents, under the laws of the country as it does to the other inhabitants, the full enjoyment of the guarantees and rights which the constitution and the same laws grant to them. And reciprocally the company and its agents bind themselves strictly to respect the laws and regulations that are in force in Nicaragua, and especially to comply with the executory judgments of the tribunals without considering themselves vested with other rights than those which the laws concede in favour of the Nicaraguans.

ARTICLE XXXVII.

The government shall establish all along the line of the canal, included between the two terminal ports, such police stations and revenue offices as in its judgment are necessary to preserve order in the region of the canal, and for the observance of the fiscal laws of the Republic. All expenses incident to this service, including those of buildings, endowments, salaries and allowances of employés and transportation of the forces, shall be paid to the government by the company on such terms and conditions as may be established, taking into consideration the requirements and necessities of such service. The company, however, shall have the power to establish guards and watchmen for the service of the canal and the enforcement of its regulations.

ARTICLE XXXVIII.

Contracts for labour on the canal shall enjoy the privileges which the laws of the country accord to agricultural contracts, provided they be clothed with the formalities that the laws require in such contracts. And the contracts in regard to canal labour that the company execute in foreign countries shall be valid and lawful in Nicaragua during the term stipulated in them, provided they do not violate the laws of the Republic; provided also the documents containing them be presented to the proper authorities, with due authentication, that they may be registered.

ARTICLE XXXIX.

The company shall be exempt during the period of this concession in peace and in war, from all manner of taxes upon the real property may acquire by virtue of this contract, and from every kind of direct

contributions, local taxes, or any other tax relating to the property and use of the canal, its buildings and constructions appertaining thereto, in its entire length, including those that are situated in the ports and maritime establishments on the two oceans, as also the lands conceded to the company for the whole term of the privileges. This franchise is not assignable to those who buy the real estate which the company may dispose of by virtue of this concession.

ARTICLE XL.

The Republic of Nicaragua shall not establish any tonnage, anchorage, pilot, lighthouse dues or charges of any kind whatsoever upon vessels of whatever class, or upon the merchandise, baggage and passengers which may pass through the canal from one ocean to the other, all such dues being reserved for the benefit of the company, as hereinafter set forth in Article 43.

But all such merchandise as shall be loaded or discharged at any point of the canal, intended for sale, shall pay the import and export duties fixed by the revenue laws of the State.

ARTICLE XLI.

With the view of securing the most ample freedom in the transit of persons and property, and in order to remove as far as possible occasions for disagreeable questions, there shall be on each side of the canal a free zone, the extent of which shall be one hundred yards, measured from the water's edge in the canal, it being understood that the borders of the lake shall not be considered as margin of the canal for the purpose of this stipulation.

All traffic declared illegal by the laws of the Republic shall be prohibited within the said zone, and the revenue authorities charged with watching and preventing smuggling shall act in conformity with the stipulations in Article 32.

It is expressly agreed that every vessel that passes through the canal shall carry on board an officer named by the government when the authorities think it necessary, and this employé shall act in conformity with the law in case he discovers its infringement.

The two ports to be constructed for the entrance and exit of the canal on the two oceans shall be declared free ports, and they shall be recognized as such from the beginning of the work to the termination of this concession.

The government in agreement with the company shall establish, by

special decree, the limits of the freedom of these ports, which limits shall not extend beyond the waters of the port, which are those included between the mouth of the canal and the entrance to the said ports.

ARTICLE XLII.

For the proper administration of the canal and its appurtenances, and in order to facilitate its construction and operation, the company shall establish the necessary regulations, which shall be binding on all persons found in its waters or its appurtenances; the sole reservation being that the rights and sovereignty of the State be respected.

It being understood that the company in the exercise of the powers conferred by this Article may not make other regulations than those necessary for the administration and particular management of the canal, and that before executing and enforcing these regulations they shall be submitted to the government for approval. The State will lend the aid of its authority for the enforcement of these regulations.

ARTICLE XLIII.

By way of compensation for the expense of surveys, construction, maintenance and operation of the canal, which under the present concession shall be at the cost of the company during the period of said privilege, it shall have the right to establish and collect for the passage of all kinds of vessels, travellers and merchandise through the canal, and in the waters and ports pertaining to it, taxes on navigation, tonnage and pilotage, towage, storage, lay days, anchorage, light, roadstead dues, wharfage hospital dues, and any other similar charges in conformity with the tariff to be established by it in accordance with Article 52, of this contract.

These tariffs may be modified by the company at any time on condition that all modifications that may be introduced shall previously be communicated to the government, which in case of finding them within the limits established by the said Article 52, shall cause them to be complied with as if they were regulations enacted by itself.

The payment of all the tariff dues shall be exacted without any exception or preference, and under identical conditions, from all vessels, whatever be the place they come from or their nationality, with the exception stipulated in the following Article.

ARTICLE XLIV.

As compensation for the privileges and concessions that Nicaragua grants by this contract, it is hereby stipulated that the Republic shall enjoy the special privilege that Nicaraguan vessels sailing under the Nicaraguan flag may navigate the canal at a reduction of fifty (50) per centum from the general tariff while engaged in the coasting trade or in the reciprocal trade with the other Republics of Central America. It is declared that the vessels referred to in the preceding paragraph must be exclusively of the Register of the Republic, and they must not be owned, either in whole or in part, by citizens of other countries.

A reduction of fifty (50) per cent. from the general tariff is also granted to vessels that begin their voyage for a foreign country in any of the ports belonging to the Republic, with a cargo wholly composed of products of the country. All the privileges to which this Article refers shall be extended to the other Republics of Central America whenever Nicaragua shall find itself free from international obligations which may prevent it, or whenever one or more of the said Republics shall form a single nation with Nicaragua. The company cannot collect any navigation dues whatever upon vessels and craft navigating the Lake of Nicaragua and its prolongations without passing out of the locks. The Nicaraguan vessels of war, and in the case above provided those of the Republic of Central America, shall not pay any dues on passing through the canal.

ARTICLE XLV.

In case it may be possible to utilize the waters of the canal and its dependencies for the irrigation of plantations, gardens and streets, or for the supply of towns that may be without it, or as motive power for private enterprises, the company shall have power to supply it, collecting dues in proportion to the amount furnished, according to the tariff that it may establish in agreement with the government.

ARTICLE XLVI.

In view of the existence of an exclusive privilege granted by the Republic in favour of Mr. F. Alf. Pellas, by a contract ratified on the 16th of March, 1877, for the navigation by steam on the lake and rivers for the purposes of the internal commerce of the Republic, the Canal Company shall have the right of expropriation against Mr. Pellas, as regards his rights and properties, on just assessments by experts, after

making a corresponding compensation according to the laws of the Republic.

It is also stipulated that the company binds itself to pay to the government of the Republic all it may from now on expend in any way for the improvement of the navigation of the river and the port of San Juan del Norte. This payment shall be made within six months of the date of the beginning of the works of the canal, and according to the original accounts of the corresponding office.

ARTICLE XLVII.

The company shall undertake at its expense the final surveys of the ground and the location of the line of the canal by a commission of competent engineers, two of whom shall be appointed by the Government of the Republic, which shall protect as far as it may the said commission.

There is granted to the concessionary company a term, not exceeding one year, in which to commence the final surveys for the canal, and one year and one half additional for completing them ; to organize the executing company, and commence the work of construction. Said terms shall begin to be counted from the date of the ratification of the present contract by the Nicaraguan Congress, published in the official paper, which shall be construed as notification. Furthermore, said terms are not to be extended, and it is understood that operations are not considered to have been begun if during the first year of the work two million dollars ($2,000,000) are not expended on it.

ARTICLE XLVIII.

A term of ten years is also granted to the company for the construction, completion and opening of the canal for maritime navigation However, should events of main force arise duly justified, and sufficient to impede the regular progress of the works during the period of the said ten years, an extension shall be granted equal in duration to the time that may have been lost by such delays.

If, at the expiration of the ten years aforesaid, the works should not be completed so as to have the maritime communication between the two oceans opened, in consideration of the great capital the company may have invested in the enterprise, and of the good will and ability it may have shown, and the difficulties encountered, the Republic binds itself to concede a new extension.

ARTICLE XLIX.

As a guaranty of the fulfilment of the obligations which the company incurs in accordance with Article 47, it shall deposit to the order of the Government of Nicaragua in a bank or in a mercantile house in the city of New York, which the government may designate, and within sixty (60) days from the date of the ratification of this contract, the sum of one hundred thousand ($100,000) dollars, American gold, which the company shall forfeit to the Republic if it do not fulfil the said obligations; and which sum otherwise shall be considered an advance to the government on account of the necessary expenses of payment of the police of the canal according to the stipulations set forth in Article 37. This deposit, as soon as made, shall be at the disposal of the government.

ARTICLE L.

In consideration of the valuable privileges, franchises and concessions granted to the company by this contract, the Republic shall receive in shares, bonds, certificates or other securities which the company may issue to raise the corporate capital, six per centum of the total amount of the issue.

Such shares, bonds, certificates or other securities shall be free of all payment on the part of the Republic, being considered as paid in full. The six per centum shall in no event be less than four million dollars ($4,000,000), that is to say, forty thousand shares or obligations of whatsoever kind of one hundred ($100) dollars each.

Of said shares, bonds, certificates or securities of whatsoever class, two-thirds shall not be transferable; but all shall participate in the benefits, interests, partitions, dividends, sinking fund, rights, privileges, and in all the advantages given to paid up shares without any distinction. The government in its capacity of shareholder shall besides have the right to appoint one director who shall represent its interest in the board of directors of the canal company from the time of its definite establishment. The shares referred to in this Article shall be delivered to the agent the government may appoint to receive them, and as soon as the company shall be ready to issue the certificates for its capital.

ARTICLE LI.

In order that the canal association may indemnify itself for the expenses it may have had to incur for the verifications, preparations, explorations and surveys hereinbefore mentioned, and for all other

expenditures that it will have to make until the definite organization of the company, it shall have the right from the time of the organization of said company to six per cent. in shares, bonds, certificates or other securities which the company may issue for the purpose of raising the corporate capital, and which are to be issued in excess of the capital to be subscribed.

These bonds, shares or securities shall be identically like the subscription shares, and issued from the same register or stock book. As a consequence, they shall participate in all benefits, interests, partitions, dividends, sinking fund, rights, privileges and of all the advantages given to the paid up shares, bonds or securities without any distinction whatever.

ARTICLE LII.

From the receipts of the enterprise the company shall take in the first place the necessary amount to cover all the expenses for maintenance, operation and administration; all the sums necessary to secure the interest, which shall not exceed six per centum, and the amortization of the obligations and of the shares, and what remains shall form the net profits, of which at least eighty per centum (80 per cent.) shall be divided among the shareholders, it being agreed that after the lapse of ten years after the completion of the canal the company shall not divide among the shareholders in payment of dividends, directly or indirectly, by issue of shares or otherwise, more than fifteen per centum (15 per cent.) annually or in this proportion, from dues collected from the aforesaid canal, and where it shall appear that these dues yield a greater profit, they shall be reduced to the fixed limit of fifteen per cent. per annum.

ARTICLE LIII.

The present concession shall be forfeited :

1st. Through the failure on the part of the company to comply with any of the conditions contained in Articles 8, 46, 47, 48 and 49.

2nd. If the service of the canal, after its completion, be interrupted for six months, except in cases of main force.

When the concession shall have been declared forfeited, from whichever of these causes, the public lands granted by this convention will revert to the Republic, in whatsoever state they may be, and without compensation even in the case that buildings may have been erected thereon.

Such lands shall be excepted as may have been alienated to private

parties by the company, with the formalities prescribed by law, provided that such alienations shall not have taken place within the six months preceding the date on which the company may have become legally liable to the penalty herein established.

ARTICLE LIV.

On the expiration of the ninety-nine years stipulated in this concession, or in the event of the forfeiture contained in the preceding Article, the Republic shall enter upon possession in perpetuity of the canal, of works of art, lighthouses, storehouses, stations, deposits, stores, and all the establishments used in the administration of the canal, without being obliged to pay any indemnity to the company.

There shall be excepted from this condition, the vessels belonging to the company, its stores of coal and other materials, its mechanical workshops, its floating capital and reserve fund, as also the lands ceded to it by the State, excepting those in which are established the works indicated in the first part of this Article, and which will revert to the State together with their immediate appurtenances as necessary for the service of the canal, and as an integral part of the same.

But the company shall have the right at the expiration of the aforesaid term of ninety-nine years, to the full enjoyment of the free use and control of the canal in the capacity of lessee, with all the privileges and advantages granted by the said concession and for another term of ninety-nine years, on the condition of paying twenty-five per cent. of the annual net profits of the enterprise to the government of the Republic, besides the dividends due to it for shares in the capital stock.

The company furthermore shall have the right to fix at its discretion the dues referred to in Article 43 of this concession, so that the shareholders still receive dividends not to exceed ten per centum per annum on the whole capital after deducting the payment of twenty-five per cent. of the net gains to the government.

At the expiration of this second term of ninety-nine years the government shall enter into perpetual possession of the canal and other properties referred to in the first part of this article, including also in this possession, all that which is included in the said first part with the exception of the reserve and the amortization funds. The failure to comply with any of the terms of the lease shall terminate it, and the State shall enter into possession of the canal and other works belonging to it in accordance with the provisions of the preceding paragraph.

ARTICLE LV.

Any misunderstanding that may arise between the State of Nicaragua and the company in regard to the interpretation of the present stipulations shall be submitted to a court of arbitrators composed of four members, two of which shall be appointed by the State and two by the company.

These arbitrators shall be designated by each of the parties within the period of four months from the day on which one of the contracting parties shall have informed the other in writing of the want of agreement on the point at issue. Should one of the parties allow the aforesaid term to pass, it shall be considered as assenting to the opinion or claim of the other.

The majority of the votes of the arbitrators shall decide finally and without recourse. In case of a tie vote the arbitrators shall select, by mutual consent, a fifth person who shall decide. If unable to agree to such nomination, they shall draw by lot the names of the diplomatic representatives accredited to Nicaragua, and the first one drawn out shall exercise the functions of the fifth arbitrator; he shall either adopt the opinion of one or the other of the parties to the controversy, or render his opinion between these extremes, and his decision shall be final and without any appeal whatever: the fifth arbitrator failing, the second person drawn shall exercise these functions, and so on successively until a decision is reached.

Prior to the initiation of the works of opening the canal the government shall formulate with the concurrence of the company rules to be observed by the arbitrators in all matters relating to procedure.

Questions between the company and individuals residing in Nicaragua, shall be under the jurisdiction of the ordinary tribunals of Nicaragua, in conformity with the legislation of the country. In matters pertaining to non-residents of Nicaragua the rules of international private law will be observed.

In witness of the foregoing stipulations, we have signed two instruments of the same tenor in Managua, on the 23rd day of March, one thousand eight hundred and eighty-seven.

AD. CARDENAS.
A. G. MENOCAL.

The government, finding the foregoing contract in conformity with the instructions transmitted, determines to approve it in all its parts and to submit it to Congress for its ratification:

Managua, April twelfth, one thousand eight hundred and eighty-seven.

E. CARAZO.

The Acting Sub-Secretary of the Interior. CANTON.

Done in the Hall of Sessions of the Chamber of Deputies, Managua, April 20th 1887.

TOMÁS ARMIJO.

LEOPOLDO M. MONTENEGRO.

LUIS E. SAENZ.

To the S. E. P., Hall of the Senate,
Managua, April 23rd, 1887.

JOAQUIN ZAVALA.

S. MORALES.

ELIODORO RIVAS.

Therefore be it executed. Managua, April 24th, 1887.

E. CARAZO.

The Sub-Secretary of the Interior in charge of the office.

ALEJANDRO CANTON.

Accepted on the same date.

CANTON. A. G. MENOCAL.

I do hereby certify the preceding signature of the Sub-Secretary of the Interior, which reads Alejandro Canton, to be genuine.

Managua, April 25th, 1887.

JOAQUIN ELIZONDO.

APPENDIX V.

CONCESSIONS AND DECREES OF THE REPUBLIC OF COSTA RICA TO THE NICARAGUA CANAL ASSOCIATION.

THE CONSTITUTIONAL CONGRESS OF THE REPUBLIC OF COSTA RICA, IN THE EXERCISE OF THE POWERS GRANTED TO IT BY SECTION 4, ARTICLE 73 OF THE CONSTITUTION.

ARTICLE FIRST.

DECREES.

The contract entered into on the 21st of July last, between the Honourable Minister of Public Works, authorized for this purpose by the Honourable President of the Republic, on behalf of the Government of the same, and Mr. Aniceto G. Menocal on behalf of the Nicaragua Canal Association, for excavating and operating an interoceanic canal, crossing, either in whole or in part, through the territory of the Republic, or running along the whole or part of its boundary with Nicaragua, is hereby approved.

The aforesaid contract with the modifications agreed to by Congress reads literally as follows:

The undersigned, PEDRO PEREZ ZELEDON, *Secretary of State for the Bureau of Public Works, especially authorized by the Honourable General, President of the Republic, to celebrate ad referendum the present contract, party of the first part, and* ANICETO G. MENOCAL, *representing the Nicaragua Canal Association, with full powers from it, and also authorized for this purpose by the Executive Committee of the said Association, party of the second part, have revised the contract for the canal made in Washington on the 17th of last May, by the party hereto of*

the first part, in his capacity as Envoy Extracrdinary and Minister Plenipotentiary of the Republic of Costa Rica, to the Government of the United States of America, and MR. HIRAM HITCHCOCK, *President of the aforesaid association; the said contract with the modifications now agreed to by the undersigned, reads of follows:*

ARTICLE I.

The Republic of Costa Rica grants to the NICARAGUA CANAL ASSOCIATION, its successors and assigns, the exclusive privilege to excavate and operate a maritime canal between the Atlantic and the Pacific Oceans, running either wholly or in part through the territory of the said Republic or along the whole, or a part of her border line with the Republic of Nicaragua.

To render this contract fully efficient between the contracting parties hereto, it will be sufficient if the association aforesaid should use or occupy for the works of the said canal, or for any of its ports in one or the other oceans, any Costa Rican waters or at least waters in which Costa Rica has joint ownership or has rights of use and navigation.

Whenever the word "ASSOCIATION" is used in this present document reference is made to the "NICARAGUA CANAL ASSOCIATION," its successors and assigns.

ARTICLE II.

The canal shall be of sufficient dimensions for the free and commodious passage of vessels of the same size as the large steamers used for ocean navigation between Europe and America.

ARTICLE III.

The State declares this work to be one of public utility.

ARTICLE IV.

The duration of the present privilege shall be for ninety-nine years, to be counted from the day on which the canal shall be opened to universal traffic.

During the aforesaid period the association shall have the right to construct and operate within the territory of Costa Rica, a railroad along the whole extent of the said canal, or those parts of the same which it may consider convenient for the better service and operation of the said work.

The Republic binds itself not to make any subsequent concessions

for the opening of a canal between the two oceans as long as the present privilege lasts.

The Republic will also abstain during the same period, from granting, within a zone of twenty-five miles along the canal, concessions for railroads from sea to sea, that might compete with the canal in the traffic between foreign nations. This restriction shall not prevent the construction of new railroads that may be convenient for Costa Rica to build to the canal, or to any point on the northern frontier of the Republic, either connecting or not with any other railroads.

ARTICLE V.

The grantee association shall have the right to establish such telegraph lines as may be considered necessary for the construction, management and operation of the canal.

The government shall have the right to use the telegraph lines of the company from any station to any station that may be included within the line from sea to sea, without being obliged to pay the company for such service.

ARTICLE VI.

The Government of the Republic declares and accepts that the ports at each extremity of the canal and the canal itself from sea to sea, during the time of this concession, shall be neutral; and consequently in case of war between other nations, or between one or more nations and Costa Rica, the transit through the canal shall not be interrupted for such cause, and the merchant vessels and individuals of all nations of the world may freely enter the aforesaid ports or pass through the canal without molestation or detention.

In general, all vessels shall freely pass through the canal without distinction, exclusion or preference, whether of persons or nationalities, provided that they pay the dues and comply with the rules established by the association for the use of the said canal and its dependencies.

The transit of foreign troops and vessels of war shall be regulated by such provisions in regard thereto as are now or may be hereafter established in the treaties between Costa Rica and other powers, or by international law. But the entrance of the canal shall be strictly forbidden to vessels of war of any nation which may be at war with Costa Rica, or with any other of the republics of Central America.

Costa Rica shall endeavour to obtain from the powers that are to guarantee the neutrality, that in the treaties to be made for that

purpose, they shall also bind themselves to guarantee the same conditions to a zone of land parallel to the canal, and also to a maritime zone in both oceans, the dimensions of which shall be fixed by such treaties.

ARTICLE VII.

The present concession shall be transferable only to such company or companies as may be organized for the purpose of constructing or operating the canal, and in no case to foreign governments or to foreign public powers.

Nor shall the association have the right to transfer to any foreign government or public power any part of the lands granted to it by this contract. But it shall have the right to make such transfers to private parties under the same restrictions.

The Republic of Costa Rica shall not *transfer* its rights and privileges in this respect to the canal to any foreign government or public power.

The people of all nations shall be invited to contribute the necessary capital to the enterprise, and it shall be sufficient for the fulfilment of this requirement to publish an advertisement for twenty consecutive days in one of the principal daily papers of each of the cities, New York, London, and Paris.

ARTICLE VIII.

The capital stock (*capital social*) of the final company which is to operate the canal shall consist of shares of the face value of one hundred dollars each, which shall be issued in such amounts as may be deemed necessary. The issue and transfer both of these shares and of all the bonds and obligations that the company may issue shall be exempt from stamp dues and from all other taxes or imposts now established or to be hereafter established in the Republic.

A five per centum, at least, of the capital stock with which the said company may be organized shall be reserved for such Central American Governments and citizens as may wish to subscribe.

As soon as the said company is ready to open subscription books, notice shall be given by it to the Governments of Costa Rica and Nicaragua, which shall invite the other governments of Central America, and through them private parties, to subscribe.

The shares which, within six months to be counted from the date of the notice given to the government of the opening of the subscription books, are not paid for shall remain at the free disposition of the company.

ARTICLE IX.

The company shall be organized in the manner and under the conditions generally adopted for such companies. Its principal office shall be either in the City of New York or in such place as may be deemed convenient.

Its first board of directors shall be composed of persons, one-half at least of whom shall be chosen from those members of the NICARAGUA CANAL ASSOCIATION who were promoters of the enterprise.

ARTICLE X.

The Government of Costa Rica, in its capacity of stockholder in the final company as hereinafter provided, shall have the perpetual right of appointing one director who shall be an integral part of the Board of Directors of the said company, with all the rights, privileges, and advantages conferred upon the other directors of the said company by the charter, by-laws, and statutes of the company, and the laws of the country under which it shall organize.

The government, in the said capacity of stockholder, shall also have the right to take part in the elections that the company may hold.

ARTICLE XI.

The said final company is bound to keep a representative in Costa Rica, vested with ample powers for everything that may be of interest to the company, either actively or passively.

ARTICLE XII.

The association shall have the most ample liberty to select and adopt the route which it may deem most convenient, advantageous and economical between the two oceans for the excavation, construction and operation of the canal and its dependencies and ports whether the same passes wholly or in part through the territory of Costa Rica or only along its border line.

Should the canal deviate from the River San Juan, in that section of the same in which Costa Rica has the right of navigation, the association binds itself to establish at such points as the engineers may deem proper, a communication between such parts of the San Juan River as may not be canalized and the dividing level of the canal, to the end of facilitating, without payment of any dues whatever, the navigation of Costa Rica vessels between the non-canalized part of the San Juan

River and the canal, by means of a lock or series of locks suitable for the navigation of vessels of six feet draught.

It is understood that this obligation does not in any manner bind the association to place or to keep in navigable condition the lower part of the river which these locks may be intended to place in communication with the canal.

ARTICLE XIII.

All expenditures for surveys, construction, maintenance and operation of the canal shall be borne by the association without any subvention in money or guarantee of interest on the part of the Republic.

ARTICLE XIV.

The association shall construct, at its expense, and shall keep in good condition two large ports, one on the Atlantic and one on the Pacific, at such points or localities as it may select within or without the territory of Costa Rica to serve as termini of the canal; and each of them shall have a lighthouse of the first order.

ARTICLE XV.

All the area within the territory of Costa Rica, whether at the ports, roadsteads or rivers of the two oceans which may be necessary for the establishment of the canal, its paths and embankments, or which may be occupied and covered by water after raising the dams which are to be constructed in the beds of the rivers, or for all necessary deviations to be made as well as for reservoirs, dikes, spaces about the locks, stations, lighthouses and canals, storehouses, buildings and workshops, deposits for materials, and also all those required for the routes, service railways and canals of the same nature, for the transportation of materials to the line of the work and for feeders of the canal; in short all lands and places within the territory of Costa Rica necessary to the construction and operation of the canal, as may be laid down in the final drawings and plans made by the engineers of the association shall be placed by the State at the disposal of the said association under the conditions set forth in the following Articles.

ARTICLE XVI.

Such unappropriated lands as belong to the State shall be given to the association without any compensation whatever, and with regard to those lands belonging to private parties the State undertakes to condemn them, should the association demand it.

The compensation which in agreement with the laws of Costa Rica may have to be paid in such cases, shall be paid by the association, and to it shall be added the amount of the expenses and costs of the respective actuations, in such a way that the National Treasury shall suffer no loss.

ARTICLE XVII.

In all relating to the condemnation to be made under the provisions of the preceding Articles the association shall enjoy all the immunities and privileges that the laws of the country grant to the State, so that the association may not be obliged to pay more than the State would under similar circumstances.

ARTICLE XVIII.

For the construction, maintenance and operation of the canal, the association shall have the right to take, free of charge, from the lands belonging to the State whatever material of a spontaneous production of the land that may be found on them, especially timber for construction and fuel, and limestone, clay for bricks and earth for fillings that are to be made. As regards materials of the said class found on lands belonging to private parties, the association shall have the same rights and privileges granted by the laws to the State.

ARTICLE XIX.

If it should be necessary for the association to occupy temporarily and during the construction of the canal lands in the territory of Costa Rica which are not included in those designated in the Articles 15, 16, and 18, it shall not be obliged to pay any compensation for them if they are unappropriated lands. And the State shall not have the right to sell or dispose of them in any other manner after the association has once determined to occupy them, unless under the reservation of this right the limit of which shall be the execution of the works of the inter-oceanic canal. Should the said lands belong to private parties, then the association shall enjoy so far as the temporary occupation thereof is concerned, all the rights and franchises which the laws grant to the State with the special privilege of occupying them immediately after the declaration of utility and necessity, and after payment of the proper compensation, which shall never exceed that which the State would be obliged to pay in a similar case.

ARTICLE XX.

The Republic of Costa Rica desiring to aid efficiently the association in this enterprise cedes in fee simple to the said association the public lands hereinafter mentioned, in alternate lots, with other similar ones which it reserves for itself, to wit:

1st. On the right or southern bank of the San Juan River, from a point three English miles below Castillo Viejo to the confluence of the San Carlos, should the canal follow the valley of the San Juan, lots fronting on the canal three English miles front by six deep.

2nd. Between the San Carlos River and the Atlantic, should the canal pass wholly or in part through the territory of Costa Rica, or along the boundary of Costa Rica, lots of three English miles frontage on the canal and four deep.

3rd. Should the route of the Salinas Bay be adopted, lots of two English miles frontage on the canal by two deep in the Costa Rican territory crossed by the canal or along which it may run, from the Pacific Ocean to a point two English miles distant from the mouth of the Sapoa River in the Lake of Nicaragua.

4th. Should the canal deviate from the San Juan River more than four miles towards the interior of Costa Rica, lots to be measured on both sides of the canal of two miles front and two deep. Should the deviation be less than four miles, then the lots of the northern bank of the canal shall have a front of two miles and extend in depth until they touch the San Juan River.

5th. From the Rio Frio to the Sapoa on the south coast of the Lake of Nicaragua, at two miles distant from the same and following the curve of its bank, lots of two English miles front by two deep.

6th. In the places where the company in accordance with the government may select from the existing unappropriated public lands, twenty-five lots, each two English miles in frontage by four deep. As a general rule, at the extremities of the inter-oceanic canal, should the same be within the territory of Costa Rica, the opposite lots will be allotted, one to the government and one to the company; but, if this be not possible, the first will belong to the government.

The State shall vest in the association the possession of said lands as soon as the location of the canal is finally determined and its construction begun by the association.

The rights acquired by private parties in the lands set forth in the preceding clauses are hereby reserved.

The measurement and setting out of all lands ceded by this contract shall be made at the expense of the grantee, with the intervention of the government.

The final title deeds shall be issued in due proportion as the work advances and not before.

Between the Atlantic and the point three miles below Castillo Viejo, all parts of the San Juan and Colorado Rivers occupied by the canal shall be considered for the purposes of the present Article as a part of the said canal.

It is hereby understood that the whole of the lands transferred to the association by Costa Rica, in the different places and in the form as set forth in the foregoing Article, shall not exceed in amount one-fourth of the total amount of lands granted to the company by the Government of Nicaragua, according to the contract made by it. Should they exceed such amount, the difference shall be deducted by reducing the number of lots mentioned in sub-division 5th of this Article.

Article XXI.

The State reserves the right to occupy, in the several lots of land ceded to the association, such space as may be needed for such roads and public buildings as it may deem convenient. In the same manner it shall have the right to use timber and other building materials which may be found on said lands, whenever they may be necessary for any work upon which it may determine. Should these lands become the property of private persons by virtue of a transfer made by the company, and the State should need them for the purpose set forth in this Article, or for some other purposes, it shall pay their owners for them in conformity with the laws, and the expropriated parties shall have no right or claim against the association.

Should the association have made improvements on the lands referred to whether for the purposes of utility, ornament or pleasure the State shall be bound to compensate it for such damages as it may suffer according to appraisals of experts.

Article XXII.

Mines of coal, gold, silver, iron or other metals and stone quarries situated in the lands ceded to the association shall belong to it by right without the necessity of previous denunciation and it shall have the right to work them whenever it may deem it convenient, subject to the

laws of the Republic, but such lands as may be transferred by the association to private parties shall not enjoy this privilege.

ARTICLE XXIII.

The association shall also have the right to utilize for the works of the canal and its appurtenances the timber in the forests situated in the lands granted to it by the State from the very moment from which it enters into possession of the same under the present contract, the acquired rights aways being reserved.

ARTICLE XXIV.

From the day in which the present concession shall be ratified by Congress, no alienation shall be made of any unappropriated lands necessary for the construction of the canal nor of those ceded to the association on the banks of the same. Nor shall the said lands be leased to the prejudice of the company. However, should the location of the canal not be definitely settled when this contract is ratified the line of the canal shall for the purposes of this Article be presumed to follow the northern boundary line of Costa Rica.

ARTICLE XXV.

The association shall have the right of doing throughout the whole extent of the canal within the territory of Costa Rica, at the mouths of the canal on the two oceans and in the whole extent of the lands which under the present contract have been granted to it according to Articles 15, 16, and 20, all such works as may be necessary for locating, levelling, excavating and dredging the canal and all other works that may be required for the establishment, feeding, operation, preservation and maintenance of the canal.

The association is especially authorized to make along the line of the canal and on the Costa Rican bank of the San Juan River and its Costa Rican affluents and confluents, as well as on the Costa Rican rivers tributary to the Lake of Nicaragua, the lakes or water-courses which may be utilized in their flow to the Pacific or to the Atlantic; to construct dikes and dams; make rectifications, dredgings, embankments and deviations, to locate buoys, and in general to do all the works that in the opinion of the engineers of the association may be deemed indispensable for the construction, feeding, navigation and operation of the canal. The embankments, fillings and dikes which may be made within the territory of Costa Rica at the mouths of the canal on the ports on

the two oceans, by using materials resulting from the excavation of the canal, shall belong in fee simple to the association; but the government shall have the right to occupy them in whole or in part after compensation made. Should any port of the canal be within the territory of Costa Rica the association shall not obstruct such port nor widen its beaches unless there is absolute necessity to do so, and in this case the embankments and fillings that it may be necessary to construct in front of said port, shall belong to the Republic.

In general the association shall have the right to use all the lakes and rivers of Costa Rica, the waters of which may be necessary in the judgment of the engineers of the association to construct and feed the canal and to maintain its operations, but this right shall have the following restrictions, to wit:

1st. The navigation of the Costa Rican rivers, which the association may dam or otherwise use for the benefit of the canal shall remain at the termination of the respective works in as good condition as it was before they were made.

2nd. In the places where the waters of said rivers may overflow in consequence of the erection of dams or other artificial obstructions made by the association, the said association shall be obliged to do whatever may be practicable to prevent the formation of swamps and marshes.

3rd. Such damages as may be caused to private parties in consequence of the deviation or elevation of the streams shall be compensated for by the association according to appraisals made by experts in conformity with the laws of the Republic, but the association shall not be obliged to pay more than the State would under similar circumstances.

Article XXVI.

The association cannot import merchandise into the territory of the Republic for the purposes of trafficking with it without paying the custom duties established by law, but it shall have the right to import free from custom duties and of any other imposts whatsoever, the articles needed for the works of the enterprise, its surveys, explorations, examination of localities, constructions, use, operation, maintenance, repairs and improvements of the canal, and also for the telegraphic and railroad service of the same, and for the works and workshops of the company, and the said articles may consist of implements, machinery, apparatus, coal, limestone of all classes, lime, iron and other metals, whether raw or manufactured, mining powder, dynamite or any other analogous substance. These articles may be transported between whatever points

they may be needed during the work of the construction of the canal, and shall be landed and stored free from all local taxes.

The association shall also have the right to import free from duties or imposts during the work of constructing the canal, such provisions, clothing for the workmen, and medicines as may be absolutely necessary for its own consumption.

Those articles the commerce of which is not free are excepted from the privileges granted in this Article, and shall remain subject, with the exception of gunpowder, dynamite and other explosives, to such requisites and duties as are established by law.

ARTICLE XXVII.

The vessels that the association may employ as tugboats or for the service of the canal shall be free from all imposts or taxes of any kind whatever, and also the material to be used for their repair and the fuel that they may consume.

The vessels and their appurtenances from whatever place they may come for the service of the association shall be exempt from all duties and imposts.

ARTICLE XXVIII.

The government shall enact such regulations as it may deem necessary to prevent smuggling, and for the preservation of public order in the region of the canal lying within the territory of Costa Rica or bordering on it, and in the waters where it may exert joint jurisdiction. The company shall be bound to lend its assistance for the enforcement of such regulations. But in the free zone along the margin of the canal, as hereinafter provided, measures for the prevention of smuggling shall be limited to vigilance on the part of the employé or employés whom it may concern, without right to any further measures either against passengers, vessels or their cargoes excepting when an attempt at smuggling may be discovered; it being the intention of the State that there shall be most ample freedom of transit through the canal for persons and property with the sole limitations established by this contract. Consequently the association shall have the right to unload and reload ships in transit at such points as may be necessary in order to make repairs or lighten the vessels or shift their cargoes, or on account of any accident that unavoidably may render it necessary, without being subject thereby to search, exactions or contributions of any kind, provided in each case, and before beginning operations, notice is given to the nearest custom house authority.

ARTICLE XXIX.

The government shall afford its protection in conformity with the laws of the Republic to the engineers, contractors, employés and labourers that may be engaged in the preliminary surveys or in the works of construction and operation of the canal.

ARTICLE XXX.

The association shall be exempt from all forced loans and military exactions, whether in time of peace or of war. The foreign agents and employés shall also be exempt from direct taxes, forced loans, and military exactions during the time in which they are in the service of the canal, but they shall pay the direct taxes established by law in case they may become owners of real property, or commercial or industrial establishments.

ARTICLE XXXI.

The association may freely introduce into the lands granted to it employés and labourers of every race who may be needed in its works and workshops; and it may also introduce immigrants of all nationalities excepting Asiatics and negroes. Both the immigrants and the employés and labourers shall be subject to the laws of the Republic and to the regulations of the company. The government assures them aid and protection and the enjoyment of their rights and guarantees in conformity with the constitution and the national laws during the time that they may remain within Costa Rican territory.

ARTICLE XXXII.

The Government of Costa Rica shall assure the association and its agents, under the laws of the Republic as it does to the other inhabitants, the full enjoyment of the guarantees and rights which the constitution and laws grant to them. Reciprocally the association and its agents bind themselves strictly to respect the laws and regulations in force in Costa Rica and especially to comply with the final decisions of the Courts, without considering themselves vested with other rights than those granted by law to Costa Rican citizens.

ARTICLE XXXIII.

The government shall establish all along the line of the canal which may be within the territory of Costa Rica or along its frontier, or in the

waters appertaining to it in ownership or joint jurisdiction such police stations and revenue offices as in its judgment may be necessary for the preservation of order in the region of the canal and for the observance of the fiscal laws of the Republic.

The expenses incident to said services including those of buildings, salaries, wages, and allowances of the employés and transportation of the forces and which may be in excess of such as are now borne by the Government for the Custom House actually established at the mouth of the San Carlos, or on any other point that may be crossed by the canal, shall be paid to the Public Treasury by the company on such terms and conditions as may be established hereafter, taking into consideration the requirements and necessities of such services.

The association shall also have the right to establish guards and watchmen for the service of the canal and the enforcement of its regulations.

ARTICLE XXXIV.

All contracts in regard to the works of the canal that the association may enter into in foreign countries shall be valid and effective, and shall have full force and effect in Costa Rica, provided they do not violate the laws of the Republic.

ARTICLE XXXV.

The association shall be exempt during the period of this concession, both in time of peace and in time of war, from all kinds of taxes upon the real estate that it may acquire by virtue of this contract, and from all kinds of direct taxes, local charges, or any other imposts relating to the property and use of the canal, or of its buildings and the construction and dependencies thereof, all along its extent, including those situated in the ports and maritime establishments on the two oceans.

This franchise is not transferable to the purchasers of the real estate which the association may alienate under this grant.

ARTICLE XXXVI.

The Republic of Costa Rica shall not establish any tonnage, anchorage, pilot or lighthouse dues, or any other charges of any kind whatsoever, upon vessels of any class whatever, or upon the merchandise, baggage and passengers which may pass through the canal from one ocean to the other; all such dues are reserved for the benefit of the association, as provided in Article 39.

ARTICLE XXXVII.

For the purpose of securing the most ample liberty or the transit of persons and property, a free zone shall be established on each side of the canal, and the width thereof shall be 90 metres and 288 millimetres, measured from the water's edge in the canal.

All traffic declared illegal by the laws of the Republic shall, however, be prohibited within the said zone, and the revenue authorities whose duty it is to watch for and prevent smuggling, shall act in conformity with the stipulations of Article 28.

It is expressly agreed that every vessel that may pass through the part of the canal which may be within the territory of Costa Rica, or along its borders or in waters over which it exerts co-jurisdiction, shall carry on board an officer appointed by the government whenever the authorities may deem it convenient, and that officer shall act in conformity with the law should he discover that it is being violated.

The two ports to be constructed for the entrance and exit of the canal on both oceans, which may be wholly or in part within the territory or in waters of Costa Rica, shall be declared free ports, and shall be recognized as such from the opening of the canal to the end of this concession.

The government, in agreement with the company, shall establish, by means of a special decree, the limits of this franchise, which shall never extend beyond the waters of the ports comprised between the mouth of the canal and the entrance of said ports.

All merchandise that shall be loaded or discharged at any point of the canal within the territory of Costa Rica, and intended for internal commerce, shall pay the import and export duties fixed by the revenue laws of the State.

ARTICLE XXXVIII.

For the proper administration of the canal and its dependencies, and in order to facilitate its construction and operation, the association shall establish the proper regulations, which shall be binding upon every person who may be found in its waters or in its dependencies; the sole reservation being that the rights and sovereignty of the State be respected.

It is understood that the association, in the exercise of the powers conferred by this Article, shall not make other regulations than those necessary for the administration and particular management of the canal; and that, before carrying them into effect, they shall be submitted for

the approval of the government. The State shall lend the aid of its authority to enforce these regulations.

ARTICLE XXXIX.

By way of compensation for the expenses incurred in the surveys, construction, maintenance and operation of the canal, or any part thereof, during the period of said privilege, the said association shall have the right to establish and collect for the passage of all kinds of ships, vessels, travellers and merchandise through the canal, and in the waters and ports pertaining to it, such dues of navigation, tonnage, pilotage, towage, stowage, lay days, anchorage, light, roadsteads, wharfage, hospital dues and any other similar charges, in conformity with the tariffs to be established by it in accordance with Article 45 of this contract.

These tariffs may be modified by the association at any time on condition that all modifications that may be introduced in it shall be previously communicated to the government, which, in case of finding them within the limits established by said Article 45, shall cause them to be complied with as if they were regulations enacted by itself.

The payment of all the tariff dues shall be exacted without any exception or preference, and under identical conditions, from all vessels, whatever be the place they come from or their nationality, with the exception stipulated in the following Article.

ARTICLE XL.

In compensation for the privileges and concessions that Costa Rica grants by this contract, it is hereby stipulated that the Republic shall enjoy the special privilege that Costa Rican vessels, navigating under the flag of Costa Rica, shall be entitled to navigate the canal at a reduction of fifty per centum of the general tariff while engaged in the coasting trade, or in the reciprocal trade with the other Republics of Central America.

To enjoy this privilege, the said vessels shall be necessarily of the register of the Republic, and belong to citizens of the same.

A reduction of fifty per centum of the general tariff is also granted to all vessels that begin their voyage for a foreign country at any of the ports belonging to the Republic, with a cargo wholly consisting of products of the country.

Costa Rican vessels of war and revenue cutters shall pay no dues in passing through the canal. No dues shall be paid by the vessels of the National Register navigating either Costa Rican waters connected with

the canal or the canal itself, without passing out of the locks, but said vessels are not in any way to obstruct the free navigation of the canal.

Costa Rica, on its part, shall not object to the enjoyment by Nicaraguan ships of the advantage granted in this Article to those of Costa Rica, provided that Nicaragua, on its part, consents that the ships of Costa Rica shall enjoy in Nicaraguan waters the said privilege.

All the concessions to which this Article refers shall be extended to the other Republics of Central America, or any of them, whenever Costa Rica and Nicaragua shall find themselves free from international obligations which may prevent it, or whenever one or more of said Republics shall form a single nation with Costa Rica.

ARTICLE XLI.

In case it may be possible to utilize the waters of the canal and its dependencies for the irrigation of plantations, gardens and streets, or for the supply of towns that may be without it, or as motive power for private enterprises, the company shall have the power to supply it, collecting dues in proportion to the amount furnished, according to the tariff that it may establish in agreement with the government.

ARTICLE XLII.

The association shall undertake at its expense the final surveys of the ground and the location of the line of the canal by a commission of competent engineers. The Government of Costa Rica shall have the right of visiting and inspecting the final surveys which are in progress, and those already completed by an engineer appointed by said government, and whose salary shall be paid by the association, the amount thereof to be fixed hereafter by special agreement between the government and the company.

A period of two years and a half to be counted from the date of the ratification of the contract is granted the association for the final surveys of the canal, and within the said time the association shall have to make the said final surveys, organize the company, which is to carry on the work, and begin the work of construction.

The work of construction shall be understood to have commenced if within three years after its inception two millions of dollars have been expended on it.

The period herein provided for shall admit of extension by the Republic at the request of the association, and upon grounds of justice, in the judgment of the government.

ARTICLE XLIII.

A term of ten years is also granted to the association for the construction, completion and opening to traffic the canal for maritime navigation. However, should events of main force arise duly justified, and sufficient to impede the regular progress of the works during the period of the said ten years, an extension shall be granted equal in duration to the time that may have been lost by such delays.

If at the expiration of the ten years aforesaid the works should not be completed, so as to have the maritime communication between the two oceans opened, in consideration of the great capital the company may have invested in the enterprise, and the good will and ability it may have shown, and the difficulties encountered, the Republic binds itself to grant a new extension.

ARTICLE XLIV.

As a guaranty of the fulfilment of the obligations which the final company which is to construct the canal incurs in accordance with Article 42, it shall deposit to the order of the Government of Costa Rica, in a bank or in a mercantile house in this city, or with an agent which the government may designate immediately after the certificates are issued, one thousand shares of its capital stock of the nominal value of $100 each. The said one thousand shares of capital stock shall be considered an advance to the government of the payment of the police and revenue expenses to be made under Article 33, and the association shall be credited with the actual value of said shares at the time such payments are made.

ARTICLE XLV.

In consideration of the valuable privileges, franchises and concessions granted by virtue of this contract to the association, the Republic shall receive in shares, certificates or other values representing the capital stock of the final company, an amount equal to one and one half per centum of the total amount of the issue of said capital stock in shares or certificates of $100 each. This sum shall in no event be less than $1,500,000. Said shares shall be considered as fully paid up, and two-thirds thereof shall not be transferable. All these shares shall participate in the benefits, interests, distributions, dividends, amortizations, rights, privileges, and all other advantages granted to paid-up shares without any difference whatever. These shares together with the other privileges

herein granted by the association to the government shall be in full compensation to the Republic for all public unappropriated lands that may be flooded and for all the privileges, and concessions conferred by this contract, and shall cover completely all claims of this description on the part of the State against the association or the final company. The shares to which this Article refers shall be delivered to the agent appointed by the government for this purpose as soon as the company may be ready to issue certificates of its capital.

ARTICLE XLVI.

From the earnings of the enterprise the company shall take, in the first place, the necessary amount to cover all the expenses for maintenance, operation and administration; all the sums necessary to secure the interest, which shall not exceed six per centum, and the amortization of the obligations and of the shares, and what remains shall form the net profits, of which at least eighty per centum (80 per cent.) shall be divided among the shareholders, it being understood that after the lapse of ten years after the completion of the canal the company shall in no case divide among the shareholders in payment of dividends, directly or indirectly, by issue of shares or otherwise, more than fifteen per centum (15 per cent.) annually or in this proportion, from dues collected from the aforesaid canal and where it shall appear that these dues yield a greater profit, they shall be reduced to the fixed limit of fifteen per cent. per annum.

ARTICLE XLVII.

The present concession shall be forfeited:

1st. Through the failure on the part of the company to comply with any one of the conditions contained in Articles 7, 42, and 43.

2nd. If the service of the canal, after it is completed, is interrupted for six months, unless in case of unforeseen accidents or main force.

When the concession shall have been declared forfeited from whichever of these causes, the public lands granted by virtue of the present contract shall revert to the Republic in whatever condition they may be, and without compensation, such lands as may have been alienated by the company with the formalities prescribed by law, shall be excepted, provided that such alienations shall not have taken place within the six months preceding the date on which the company may have become legally liable to the penalty herein established.

ARTICLE XLVIII.

At the expiration of the ninety-nine years stipulated in this concession, or in the event of the forfeiture expressed in the preceding Article, the Republic shall enter into the possession in perpetuity of that part of the canal, its warehouses, stations and other establishments used for the management thereof, that may be found within the national territory. Such works as may be found in waters in which the Republic has joint sovereignty shall belong to her in joint ownership. And in regard to such parts of the canal or of the waters thereof in which Costa Rica has not the eminent domain, but simply the right of use and free navigation, the Republic, at the expiration of the ninety-nine years, or in the cases of forfeiture above named, shall retain in perpetuity the said rights of use and free navigation. The Republic shall not be obliged to pay to the company any compensation for the same.

There shall be excepted from this condition the vessels belonging to the company, its stores of coal and other materials, its mechanical workshops, its floating capital and reserve fund, and at the expiration of the said ninety-nine years, also the lands ceded to it by the State under the present contract, excepting those in which the works indicated in the first part of this Article may be found established, which will become the property of the State, with their immediate dependencies as necessary for the service of the canal and an integral part of the same.

But the company shall have the right, at the expiration of the aforesaid term of ninety-nine years, to the full enjoyment and a free use and control of the canal, and such parts thereof as may be within the territory of Costa Rica, with all the privileges and advantages granted by this concession in the capacity of lessee for a second period of ninety-nine years, upon payment to the government of Costa Rica of six and one-quarter per centum of the annual net profits of the enterprise, besides the dividends due to it for its share in the capital stock.

The company shall have the right to fix at its discretion the dues referred to in Article 39 of this concession, so that the shareholders, after the payment of 31 1-4 per cent. is deducted, shall still receive dividends of ten per cent. per annum on the whole capital.

At the expiration of this second period of ninety-nine years, the government shall enter into perpetual possession of the canal and the other property referred to in the first part of this Article; and this delivery shall also embrace everything excluded in the said first part except the lands ceded to the association by this contract, and the reserve and sinking fund.

The failure to comply with any of the conditions of the lease shall terminate it, and the State shall enter into the possession of the part of the canal which corresponds to it, owing to it being situated in Costa Rican territory, or in the places in which Costa Rica is joint owner, and also of the other works which belong to the canal in accordance with the provisions of the preceding paragraph.

ARTICLE XLIX.

Any misunderstanding that may arise between the Republic and the company in regard to the interpretation of the present stipulations shal be submitted to a Court of Arbitrators, composed of four members, two of whom shall be appointed by the State and two by the company.

These arbitrators shall be designated by each party within the period of four months from the day on which one of them shall give notice to the other in writing of the want of agreement on the point at issue. Should one of the parties allow this period to lapse it shall be considered as assenting to the opinion or claim of the other.

The majority of the votes of the arbitrators shall finally decide without recourse. In case of a tie vote the arbitrators shall appoint, by mutual consent, a fifth person who shall decide, and in case of their default the respective parties will appoint him. If they cannot agree to such appointment they shall draw by lot the names of the diplomatic representatives accredited to Costa Rica, and the first one drawn out shall exercise the functions of the fifth arbitrator. He shall concur on one of the two opinions, and what may be so decided shall be final and without recourse of any kind. If the fifth arbitrator should fail, the second person drawn shall exercise these functions, and so on successively until the decision is reached.

Prior to the initiation of the work of opening the canal, the government, in concurrence with the company, shall formulate a set of rules to be observed by the arbitrators in all matters relating to procedure.

All questions between the association and private parties residing in Costa Rica shall be determined by the ordinary Courts of Costa Rica in conformity with the legislation of the Republic. In matters pertaining to parties not residing in Costa Rica the rules of private international law shall be observed.

ARTICLE L.

This contract, after being approved by the Hon. General President of the Republic, shall be submitted to the supreme legislative power for

the purpose that if they deem it convenient they should impart to it the necessary ratification, and in case such approval is not obtained, the Nicaraguan Canal Association will be released from all the obligations to which it is bound by it. Such ratification or non-ratification shall be made within one hundred and twenty days from this date.

In witness whereof, the undersigned have set their hands to four copies of the present contract, two for each party, in San José de Costa Rica, 31st July, 1888.

PEDRO PEREZ ZELEDON.
A. G. MENOCAL.

Palace of the President,
San José, *July* 31, 1888.

In consideration that the foregoing contract agrees with the instructions given for its celebration to the Honourable Secretary of State, who authorizes it, it is hereby approved in all its parts for the purpose that it may be submitted to the deliberation of the Constitutional Congress.

Countersigned by his Honour the President of the Republic.

PEREZ ZELEDON.

Article Second.

The contract to which the foregoing article refers is hereby exempted from the payment of stamp duties.

To the Executive Power.

Given in the Hall of Sessions of the National Palace in San José, on the 9th day of August, 1888.

A. ESQUIVEL,
President.

MANUEL J. JIMENEZ,
Secretary.

FELIX GONZALEZ,
Vice-Secretary.

Presidential Palace,
San José, *August* 9, 1888.

Therefore be it executed.

BERNARDO SOTO.

The Secretary of State of the Department of Public Works.

MAXIMO FERNANDEZ.

APPENDIX VI.

UNITED STATES CHARTER OF THE MARITIME CANAL COMPANY OF NICARAGUA.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That Frederick Billings, Charles P. Daly, Daniel Ammen, Francis A. Stout, Horace L. Hotchkiss, Edward F. Beale, Hiram Hitchcock, C. Ridgley Goodwin, A. C. Cheney, J. F. O'Shaughnessy, H. C. Taylor, J. W. Miller, A. S. Crowninshield, A. G. Menocal, Charles H. Stebbins, T. Harrison Garrett, Jules Aldigé, R. A. Lancaster, Alfred E. Mills, Gustav E. Kissell, Horace Fairbanks, George H. Robinson, Alfred B. Darling, Joseph E. McDonald, James Roosevelt, Christian Devries, Frederick F. Thompson, Henry A. Parr, and such other persons as may be associated with them and their successors are hereby constituted and created a body corporate and politic in deed and in law, by the name, style and title of "The Maritime Canal Company of Nicaragua," for the construction, equipment, manager ment and operation of a ship-canal from the Atlantic to the Pacific Ocean either entirely through the territory of the Republic of Nicaragua or through Nicaragua and in part through the territory of the Republic of Costa Rica with such collateral, connecting or cross canals as may be necessary to connect therewith, and to exercise such other powers as have been conferred by the Government of Nicargua by the concession of that Republic to the Nicaragua Canal Association, through Mr. A. G. Menocal, its representative, and dated the twenty-third day of March, anno Domini eighteen hundred and eighty-seven, and finally approved by the legislative and executive authority of the Republic on the twentieth, twenty-third, and twenty-fourth days of April, anno Domini eighteen hundred and eighty-seven, and such powers as the Republic of Costa Rica may confer of the same kind as those named in said concession; and the said Maritime Canal Company of Nicaragua, by

that name shall have perpetual succession, may sue and be sued, plead and impleaded, defend and be defended in all courts of law and equity within the United States; may make and have a common seal; and shall have and possess the rights, powers and privileges usually possessed by similar companies. It may receive, purchase, hold and convey such real and personal estate, property and rights of property, or concessionary rights as may be necessary to carry into effect the purposes of this act; may issue stock to the amount of the just value of such estate, property, and rights, and for work and labour done or materials provided in the execution of the work of constructing said ship-canal; and the stock issued for these purposes shall be deemed paid-up stock and shall not be liable to any further calls or assessments; may do all lawful things to secure the full enjoyment of the powers, privileges, rights, benefits and grants contained in any canal concession so made by the Republic of Nicaragua or to be made by the Republic of Costa Rica, as aforesaid; and to aid in the construction of said canal and to carry out the purposes of this act the said Maritime Canal Company of Nicaragua is hereby authorized to issue its bonds, and to secure the same by mortgage on its property and rights of property of all kinds and descriptions, real, personal and mixed, including its franchise to be a corporation. The principal office of said corporation shall be in the city of New York, and all legal process may be served upon the person who may at the time be in charge of said office or upon the attorney of said company, whose name and address shall be certified by the president of the company, and such certificate shall be filed in the office of the Secretary of State of the United States. *Provided, however*, That nothing in this act contained shall be so construed as to commit the United States to any pecuniary liability whatever for or on account of said company, nor shall the United States be held in anywise liable or responsible in any form or by any implication for any debt or liability in any form which said company may incur, nor be held as guaranteeing any engagement or contract of said company, or as having assumed, by virtue of this act, any responsibility for the acts or proceedings of said company in any foreign country, or contracts or engagements entered into in the United States.

Sec. 2. That the capital stock of said company shall consist of not less than one million shares of one hundred dollars each, with the right to increase the capital stock to two million shares of one hundred dollars each, upon the vote of two-thirds of the stock of said company at any time outstanding, which shares shall in all respects be deemed personal property and shall be transferable in such manner as the by-laws of said

corporation may provide. Five incorporators who shall be chosen by a majority of the number from those named in this act, shall have power to open books of subscription to the capital stock of said company in the city of New York, and at such other places in the United States, Nicaragua, or elsewhere, as they may designate, who shall receive all subscriptions for stock; and no stock shall be transferable except upon the books of the company provided for that purpose. The said incorporators shall give thirty days' notice of the time and place of the opening of said books, by publication in one daily newspaper in New York City, and one newspaper in Managua, Nicaragua, and one in San José, Costa Rica, if the said canal should be in part in the territory of that Republic. Sixty days' previous notice shall be given of the payment required of the time and place of payment by publication in one daily newspaper in the city of New York and in one newspaper in Managua, Nicaragua, and one in San José, Costa Rica, if the said canal should be in part in the territory of that Republic; and in case any stockholder shall neglect or refuse to pay, in pursuance of such notice, the stock held by him may be sold to the highest bidder for cash, according to the regulations to be made therefor in the by-laws of the said company. The directors hereinafter provided for may adopt regulations and by-laws not inconsistent with the provisions of this act. All shares, stocks, bonds, certificates, or other securities which the company may issue to raise the corporate capital shall be executed and issued at the principal office in the city of New York.

SEC. 3. That no certificates for stock, except as otherwise provided in this act, shall be issued till at least ten per cent. of the par value thereof shall be fully paid for in money, and such money deposited in the treasury of said company: and there shall be at least $1,000,000 in money paid on such subscriptions into the treasury of said company within one year from the passage of this act; and said company is hereby prohibited from returning or repaying any part of the money so paid. No part of the capital stock paid in shall be at any time withdrawn or returned to the stockholders, or in any manner diverted from the proper uses of the corporation. Any violation of the provisions of this section shall subject the charter to forfeiture.

SEC. 4. That the affairs of the said company shall be managed by a board of directors, fifteen in number, who shall hold their office for three years and until their successors are duly chosen and qualified, and a majority of whom shall be citizens and residents of the United States.

At the first election five shall be chosen by the stockholders for one year, five for two years, and five for three years, and at each annual election thereafter five shall be chosen by the stockholders for three years. The said board shall elect from its number a president, who shall be a citizen and resident of the United States, and one or more vice-presidents of the company, who shall also be citizens and residents of the United States, who shall hold office for such terms as the by-laws of said board may provide, and until their successors are duly elected and shall have qualified.

SEC. 5. That for the management and disposition of the stock, property, estate, and effects of the said company, the board of directors may make such by-laws, rules, and regulation as may conform to the authority granted in such canal concessions, and not be inconsistent with this act, of the laws of the United States, or the existing treaty stipulations of the United States with the Government of Nicaragua or of Costa Rica, if the said canal should be in part in the territory of that republic; and may fix the time for election of directors, and in case of vacancy in said board, caused by death, resignation, or otherwise, may fill the same. No person shall be a director who is not a stockholder, and any one ceasing to be a stockholder shall cease to be a director. All meetings of stockholders shall be held at the office of the company in the city of New York, and at least one such meeting shall be held in each year; but failure to elect directors on the day appointed by said by-laws shall not be deemed to dissolve said company, but such election may be holden on any day appointed thereafter by the directors, first giving thirty days' notice thereof in manner aforesaid. The directors, of whom eight, including the president, shall be a quorum, shall have full power touching the election or appointment of all officers of the company, and said officers shall hold office at the will and pleasure of said board.

SEC. 6. Said company shall make a report on the first Monday of December in each year, to the Secretary of the Interior, which shall be duly verified on oath by the president and secretary thereof, giving such detailed statement of its affairs and of its assets and liabilities as may be required by the Secretary of the Interior, and any wilfully false statement so made shall be deemed perjury, and punishable as such. And it shall be the duty of the Secretary of the Interior to require such annual statement, and to prescribe the form thereof and the particulars to be given thereby.

SEC. 7. Nothing in this act contained shall be deemed or construed

to in any wise restrict or impair any right of the United States under any treaty in force with the Republic of Nicaragua.

SEC. 8. That Congress shall at all times have the power to alter, amend, or repeal this act, when it its judgment the public good may so require. This act shall expire and be of no force or effect at the end of three years unless the construction of said canal shall be commenced and prosecuted in good faith within that time.

Approved February 20th, 1889.

APPENDIX VII.

NICARAGUA CANAL CONSTRUCTION COMPANY.

REPORT OF THE BOARD OF CONSULTING ENGINEERS, MAY 9TH, 1889.

To the Nicaragua Canal Construction Company.

GENTLEMEN: The undersigned were requested by your letter of January 10th, 1889, to examine the plans and estimates prepared by your chief engineer, Mr. A. G. Menocal, for a ship canal between the two oceans at Nicaragua, and to indicate the cost, in their judgment, of constructing a canal along the line proposed and following, in general, the plans of your chief engineer. You also requested an opinion upon the practicability of the canal as now proposed, with due reference to the end in view, namely, the safe and convenient passage of sea-going ships from ocean to ocean. We beg to present the following report:

We have carefully examined the unusually full maps, profiles, borings, samples of materials, etc., which have been prepared and collected under the directions of your chief engineer, and the completeness and excellent form of which reflect credit upon your engineering staff.

We find certain elements of the designs submitted which may probably be advantageously modified. This would in some cases reduce and in others increase the quantities. It is also altogether likely that some parts of the work may be let at lower and other parts at higher prices than are estimated. We, however, are disposed to base our conclusions on quantities and prices which should prove sufficient to accomplish it upon the assumption of good and honest management, backed by an ample treasury. We have necessarily borne in mind the fact that the cost of the notable precursors of this canal project, both at Suez and Panama, has greatly exceeded the amount of the original

estimates, and that this has been true of many other important works. While this might be, perhaps, in a large measure traced to unfortunate management, as well as the lack of such careful preliminary studies as have been laid before us in this case, we have nevertheless endeavoured to guard against a similar result by a liberal allowance for every apparent contingency.

Acting on this principle, we have not yet deemed it wise to reduce the quantities or prices of your chief engineer's estimates in any instance, even when it appeared possible that this might prudently be done. His figures are, of course, founded upon a better knowledge of the local conditions than we can now possess. But to the extent to which it has appeared at all doubtful we have liberally increased one or both. Our conclusions are as follows :

The project, as a whole, appears to have comparatively few elements of doubt about it, as contrasted with other works of at all similar magnitude, and we consider it to be unquestionably feasible. The great area of Lake Nicaragua offers immunity from serious floods by regulating flow. Much of the earth excavation and dredging, the rock drilling, and the concrete mixing can be done by mechanical means, to that extent reducing the need for manual labour. The dams and embankments are proposed to be made largely from the immense mass of otherwise useless rock spoil. Under the climatic conditions, as we understand them, an adequate supply of labour should be obtainable. The project in detail consists of the following elements :

First. Of 10 miles on the east end and 0.57 miles on the west end of sea-level canal dredged in from coast. The borings submitted seem to warrant the opinion that this will be entirely through alluvial deposits, as is also the case in certain parallel river diversions. The samples of material taken from these borings all appear favourable for dredging, and the cost of such dredging can be foreseen with the greater precision, because less influenced by climate, weather, and rates of wages than most other engineering work.

Second. Of a flight of three locks on each end, all within a distance of about one and one-half miles at one end and two miles at the other, by which the ascent is made from the sea-level to the summit-level of 110 feet (this elevation being some four feet less on the eastern end to allow for a necessary fall of three-fourths of an inch per mile in the San Juan River). These locks are shown by the borings submitted to be all founded on rock. The proposed size for locks, 650 feet by 70 feet by 30 feet deep, seems sufficient for all demands.

Third. Of a very long summit level of 155.98 miles, consisting of four main parts:

(*a*) The great divide cuts of 3 and 8 miles in length, respectively, which are shown by the evidence submitted, to consist chiefly of rock, overlaid with a few feet of earth.

(*b*) The Deseado, San Francisco, Michado, and Tola basins formed by dams, furnish 21.57 miles of slack-water navigation, 18.13 miles of which require no excavation, and the remaining 3.44 miles earth dredging only.

(*c*) The river San Juan, raised in level by a dam at Ochoa, so as to furnish slack-water navigation, and Lake Nicaragua furnish together 121 miles of free navigation, of which 36.5 miles require some earth dredging and 3.83 miles some rock dredging.

(*d*) An inconsiderable amount (1.63 miles) of canal section in earth, chiefly to connect the San Francisco and Machado basins.

The two great rock cuts are by far the heaviest features of the work. In considering the plans for them and determining the proper amount and cost of work, we have felt that every provision should be made to secure permanent slopes, and to provide a section suitable for any vessels which can pass the locks. We think that the estimates, as modified by us, will secure these results.

The four great basins present a most admirable feature of the plans. As compared with a restricted canal channel, they facilitate navigation as well as reduce the cost. They are made, as is also the slack-water navigation of the San Juan River, by dams and embankments of considerable extent, none, however of very great height. The plans submitted provide for forming these dams and embankments chiefly of heavy rock filling, the proximity of the great rock cuts (from which material must otherwise be wasted) to the sites of these dams and embankments facilitating their permanent construction at moderate cost. While we are not ready to say that the details of the plans submitted may not be, in some respects, modified, we regard the estimates adopted as sufficient to attain the results desired, subject to the following contingency:

There is the possible hazard in respect to the San Francisco and other basins, that they may not prove sufficiently retentive, owing either to leakage around the ends or under the bases of the dam and embankments, or to conceal permeable strata beneath the natural surface. We deem this a remote danger since both the surface and subterranean formations, so far as revealed by borings and by the reports of the

observations of reliable men, familiar with the locality, are favourable.

For a work of ordinary magnitude we would accept such evidence as ample, but in view of the great area and volume of the basins, we agree that the possibility ought to be covered by the estimate. The probability is great that there are no permeable strata beneath the surface; if they exist they might not necessarily cause leakage, and even if leakage resulted, it would not necessarily do serious harm. Concentrated leakage, if it occurred, might possibly be remedied, and if it should develop at all would be likely to occur at an early stage of the work of construction. The worst result to be feared is that it might impel a modification of the original features of the project, enforcing a lowering of the water level at certain points, and at an additional cost of about $7,000,000. Under the circumstances we, out of abundant caution, have deemed it wise and right to make the general contingency of allowance ($14,633,262) large enough, in our opinion, to cover this amount.

The requisite depth in the San Juan River and in Lake Nicaragua is obtained by a considerable amount of dredging, largely of earth, but also with an amount of rock blasting under water, the precise extent and cost of which it is exceptionally difficult to foresee. We have therefore made an allowance for this work.

We have included in the estimates the sum of $1,035,000, for the diversion of the Rio Grande, as it seems proper to provide for the possible necessity of the diversion of this important stream from the canal. We have also included in the estimate the amount named by the chief engineer for the work that may be necessary in the valley of the San Carlos and in the construction of the canal between Lake Managua and Lake Nicaragua, this construction being a requirement of the concession.

The estimates for the harbour improvements at Brito and Greytown we leave unchanged. It appears probable that the amounts estimated may prove ample for all requirements other than gradual enlargement of basin areas, but whether so or not (and it is always extremely difficult to anticipate with certainty what may be the ultimate requirements for work of this class), we do not see the necessity in this work, as we do in the canal proper, for the endeavour to provide at the outset for all future demands of commerce. Sufficient expenditure, prior to the opening of the canal, to meet reasonable requirements for the first year or two after opening is all that we have taken into consideration in our

estimates. The canal once opened, adequate harbours can certainly be provided at a moderate percentage on the total cost of the canal, even should the sum herein estimated for harbours and contingencies prove insufficient. We must not be understood as implying by this statement, however, that we now see reason to fear that the present estimate for harbour work will probably prove inadequate. Such is not the fact.

It may not be regarded as improper to mention also that while the cuts, locks, dams, etc., should be completed for the full depths at the outset, something like one-fifth of the total amount of the estimate is for dredging and earth excavation under water, which is not required to afford twenty feet draught, and which can be completed with little or no disadvantage after the canal has been so far constructed as to pass vessels of that draught, making it possible—if found advisable—to open the canal for twenty feet draught for about four-fifths of the final cost.

Our estimate, which is intended to represent the maximum sum which the canal ought to cost, assuming, as aforesaid, integrity, good management, and no interruption of work from financial or other causes, is as follows:

Auxiliary railways, double track, standard gauge, from divide cut east to Greytown, and from divide cut west to Ochoa Dam, 20 miles, and telegraph, temporary and permanent systems		$1,110,000
Same on Pacific slope, Rio Lajas to Brito, 18 miles		459,000
		1,569,000
Harbour works, Greytown	$2,550,667	
Harbour works, Brito	1,720,128	
		4,270,795
Eastern division:		
Section 1, from Greytown to the divide		5,298,527
Section 2, the eastern divide		18,333,639
Locks Nos. 1, 2, and 3		4,195,828
Diversion of the Deseado and San Juanillo		982,016
San Francisco division		5,411,551
Lake and river division:		
Rio San Juan		3,685,701
Lake Nicaragua		2,211,825
Dam at Ochoa		726,137
Western division:		
From Lake Nicaragua to the Pacific		12,133,849

Western division:	
Diversion of Rio Lajas	$346,786
La Flor dam	577,520
Locks 4, 5, and 6, and guard gates	3,899,116
Right of way indemnity...	100,000
Auxiliary work—guard gates in divide, piers at lake, bridges, etc.	1,139,018
Embankments and weirs in the valley of the San Carlos and canal between Lake Managua and Nicaragua ...	1,000,000
Diversion of the Rio Grande...	1,035,000
For engineering, management, labour agencies, shops, police, sanitary service, and incidentals	6,250,000
	73,166,308
Add to cover specified and unspecified contingencies of construction, 20 per cent	14,633,262
Grand total of estimate	87,799,570

In conclusion, we think it proper to express our opinion that the exploration and studies of the region have been sufficient to warrant the conclusion that, unless hindered by obstacles or sinister influences such as would, if permitted to weigh, forbid the success of all ventures, this enterprise is full of promise.

Respectfully,

JOHN BOGART.
E. T. D. MYERS.
A. M. WELLINGTON.
H. A. HITCHCOCK.

I concur in the foregoing estimates as being in the aggregate ample for the purposes stated.

CHAS. T. HARVEY.

MAY 9, 1889.

APPENDIX VIII.

FIFTY-THIRD CONGRESS, SECOND SESSION.

(S. 1481.—Report No. 331.)

IN THE SENATE OF THE UNITED STATES.

January 22, 1894.—Mr. Walthall (for Mr. MORGAN) introduced the following bill; which was read, twice and referred to the Committee on Foreign Relations.

April 14, 1894.—Reported by Mr. MORGAN with an amendment, viz.: Strike out all after the enacting clause and insert the part printed in italics.

A bill (S. 1481) to amend the act entitled "An Act to incorporate the Maritime Canal Company of Nicaragua," approved February 20, 1889.

Be it enacted, etc., That the capital stock of the Maritime Canal Company of Nicaragua shall consist of 1,000,000 shares of $100 each, and no more.

SEC. 2. That the words "the Nicaragua Canal," whenever used in this act, or the act to which this

FIFTY-THIRD CONGRESS, SECOND SESSION.

(H.R. 7639.—Report No. 1201.)

IN THE HOUSE OF REPRESENTIVES.

July 5, 1894.—Committed to the Committee of the Whole House on the state of the Union, and ordered to be printed.

Mr. Mallory, from the Committee on Interstate and Foreign Commerce, reported the following bill, in lieu of H.R. 6058, H.R. 6853, H. R. 6682, and H. R. 7108:

A bill (H. R. 7639) to amend the act entitled "An act to incorporate the Maritime Canal Company of Nicaragua," approved February 20, 1889.

Be it enacted, etc., That the capital stock of the Maritime Canal Company of Nicaragua shall consist of 830,000 shares of $100 each, and shall be nonassessable, and no more than this number of shares shall be issued except by the consent of Congress.

SEC. 2. That the words "the

is an amendment, shall be held to include all real and personal property and franchises, railways, piers, channels, dams, locks, embankments, and other works necessary for or incidental to the construction, equipment, maintenance, and operation of the said interoceanic canal, made or that may be made by the Maritime Canal Company of Nicaragua, or under its authority, by virtue of the said acts and the concessions granted or to be granted by Nicaragua and Costa Rica.

SEC. 3. That in consideration of the provisions of this act, and before any bonds are issued under the provisions thereof, all the stock of the Maritime Canal Company of Nicaragua heretofore subscribed for or issued, except as in this act provided, shall be called in, cancelled, and restored to the treasury of the company, so that none shall remain outstanding; all bonds issued by said company and obligations to deliver bonds shall be redeemed and cancelled; all outstanding liabilities of said company shall be satisfied, and all contracts and agreements heretofore made, not consistent with the provisions of this act, shall be cancelled, to the satisfaction of the Secretary of the Treasury, it being the intent and object of this act to secure the construction of the Nicaragua Canal by the said company, with the aid of the United States and under Nicaragua Canal," whenever used in this act, or the act to which this is an amendment, shall be held to include all real and personal property and franchises, railroads, piers, channels, dams, locks, embankments, and other works necessary for or incidental to the construction, equipment, maintenance, and operation of the said interoceanic canal made or that may be made by the Maritime Canal Company of Nicaragua, or under its authority, by virtue of the said acts and the concessions granted or to be granted by Nicaragua and Costa Rica, and shall include the exclusive right to navigate by steam the San Juan River and Lake Nicaragua granted to Señor F. A. Pellas by the Republic of Nicaragua, March 16, 1877.

SEC. 3. That if the Maritime Canal Company of Nicaragua shall, within nine months from the passage of this act, show to the satisfaction of the Secretary of the Treasury that all the stock of the Maritime Canal Company of Nicaragua heretofore subscribed for or issued, except that heretofore issued to the States of Nicaragua and Costa Rica, has been called in, returned to, and cancelled by the treasurer of the company so that none shall remain outstanding, and that all bonds issued by said company and obligations to deliver bonds have been redeemed and cancelled, and all liabilities of the

the general supervision of the Secretary of the Treasury, to the extent herein provided, upon the basis of all the concessions of Nicaragua and Costa Rica now owned by said canal company, as far as practicable, at its actual cost.

SEC. 4. That to secure the means to construct and complete said canal, and to meet the expenditures on account thereof, the said Maritime Canal Company of Nicaragua is hereby authorized to issue either coupon or registered bonds, or both, of the said company, in denominations of not less than $50 nor more than $1,000 to an amount not exceeding $70,000,000, to be dated on the 1st day of January, 1894, to be payable on the 1st day of July, 1924, but redeemable at the pleasure of the United States at any time after the 1st day of July, 1904, with interest at the rate of 3 per cent per annum, payable quarterly on the 1st day of April, July, October, and January of each year, from the delivery of the bonds to said company by the Secretary of the Treasury from time to time as in this act provided: *Provided*, That prior to the 1st day of July, 1897, no bonds endorsed shall be issued from the Treasury in excess of $30,000,000, and on or before said date the President of the United States may at any time suspend the issue of said indorsed bonds until Congress, being in-

said company have been satisfied, and all contracts and agreements heretofore made, including all contracts with the Nicaragua Canal Construction Company, have been cancelled, the Secretary of the Treasury shall, in behalf of the United States, subscribe for 700,000 shares of the capital stock of said company, and said company shall thereupon issue to the said Secretary of the Treasury of the United States 700,000 shares of the capital stock of said company herein provided for, to be deposited with the Treasurer of the United States, which stock shall be issued in consideration of the guaranty by the United States of the bonds of said company, hereinafter provided for, and shall be regarded as fully paid and nonassessable. In addition thereto 10,000 shares of nonassessable capital stock of said company shall be delivered to such person or persons as may be designated by the stockholders of said Maritime Canal Company, whose stock has been surrendered and cancelled as hereinbefore required.

SEC. 4. Upon the issuance and delivery of the stock hereinbefore provided for, the places of the directors of the Maritime Canal Company of Nicaragua, except such as represent the States of Nicaragua and Costa Rica, shall become vacant. The board of directors of the Maritime Canal Company of Nicaragua shall consist of eleven

formed by him of the reasons for such suspension, shall otherwise direct.

And said bonds shall be secured by a first mortgage on its property and rights of property now existing or hereafter acquired of all kinds and descriptions, real, personal, and mixed; of all franchises and rights of the said company, including its rights and franchise to be a corporation. Such mortgage shall contain a provision for a sinking fund sufficient for the payment of said bonds at maturity. Such mortgage shall be so framed as to be valid as a first lien under the laws of Nicaragua and Costa Rica. The form and sufficiency of such mortgage as the first lien upon the Nicaragua Canal and of the provision for the sinking fund shall, before execution, be approved by the Attorney-General of the United States, and the trustees named in such mortgage shall be approved by the Secretary of the Treasury, and such mortgage shall be duly executed in triplicate by the officers of said company. And such mortgage shall be recorded in the office of the Secretary of the Treasury in Washington, and in the proper offices in Nicaragua and Costa Rica to be designated by the said States.

SEC. 5. That the said mortgage bonds shall be prepared, engraved, and printed at the Bureau of Engraving and Printing in the city of

directors, one to be appointed by Costa Rica, one by Nicaragua, and one by the stockholders of the Maritime Canal Company other than the said governments, and eight to be appointed by the President of the United States, by and with the advice and consent of the Senate, and removable by the President of the United States for cause. In case of a vacancy in the membership of directors appointed by the President, the same shall be filled by appointment by the President in the same manner for the unexpired term. That no directors appointed by the President of the United States shall own, directly or indirectly, any stock or pecuniary interest in said company, nor shall any stockholder, director, officer, or employé be connected in any manner with or interested, directly or indirectly, in any contract made by the said company for implements, equipment, material, or anything connected with the construction, equipment, or operation of said canal, and not more than four of said directors shall be appointed from one political party.

SEC. 5. At their first meeting the directors appointed by the President of the United States shall proceed to divide themselves by lot into three classes, one of which shall consist of two directors, who shall hold office for two years; one of three directors, who shall hold

Washington at the expense of said Maritime Canal Company of Nicaragua, and, after being duly executed by the officers of said company, shall be deposited in the Treasury of the United States at Washington, and shall be issued by the Secretary of the Treasury from time to time to the said Maritime Canal Company of Nicaragua only as the work on the Nicaragua Canal progresses, as hereinafter provided.

Before the issue of said bonds by the Secretary of the Treasury he shall cause to be engraved and printed and duly executed on each of said bonds the guaranty of the United States, in accordance with such regulations as may be prescribed by the President of the United States, in the words and figures following, to wit:

"The United States of America guarantees to the lawful holder of this bond the payment by the Maritime Canal Company of Nicaragua of the principal of said bonds and the interest accruing thereon, and as it accrues."

And no bonds shall be issued by the said company except as provided for in this act.

And the Secretary of the Treasury is hereby authorized and directed, if the interest on said bonds as it becomes due is not paid into the Treasury of the United States by the Maritime Canal Company of Nicaragua, to pay the same, and the sum required

office for four years, and one of three directors, who shall hold office for six years, and until their successors are appointed and qualified, and their successors, respectively, shall hold office for six years. The director named by the holders of stock, other than that held by the United States and the States of Nicaragua and Costa Rica, shall hold office for six years and until his successor is appointed and qualified. Six of the eleven directors, of whom five at least must be directors appointed by the President of the United States, shall constitute a quorum for the transaction of business. The board of directors shall elect a president and vice-president from their number, and also a secretary and assistant secretary and treasurer, but neither the secretary nor the assistant secretary nor the treasurer shall be a director.

The treasurer of said Maritime Canal Company shall give bond to said company in such sum as may be fixed by the board of directors.

SEC. 6. The compensation of the directors shall be $5,000 per year, except the president, who shall receive $6,000 per year. The actual travelling expenses incurred by said directors in the service of the company shall be paid on approval of the same by the president of the board. The directors shall fix the salaries and compensation of all their employees, agents,

for that purpose is hereby appropriated, out of any money in the Treasury not otherwise appropriated. And all payments of principal of said bonds, or the interest thereon, shall be made through the Treasury of the United States.

The Maritime Canal Company of Nicaragua shall pay the interest on the guaranteed bonds herein provided for as it becomes due into the Treasury of the United States, and the guaranty of the United States shall not be held or construed as lessening the liability of said company as the principal obligor in said bonds. Upon the failure of said company to pay the interest as it becomes due on said bonds, and upon the payment of such interest by the United States, the said company shall be charged with and shall pay to the United States the amounts paid by the United States on such guaranty, with interest annually at 4 per cent. until paid.

SEC. 6. That for all sums that the United States may pay upon the principal or interest of said bonds under their said guaranty, the United States shall be subrogated to all the rights and liens under the said mortgage which the holders of said bonds or any of them would have had in respect thereof if the same had remained unpaid by the Maritime Canal Company of Nicaragua, and had and managers, including engineers not detailed for duty by the Secretary of War.

Every director appointed by the President of the United States shall visit the canal and make a personal examination of the works at least once each year. And they shall on or before the 15th day of November of each year make and send to the President of the United States a full and complete report in writing of all the acts and doings of the company, with a clear and detailed statement of the progress and condition of the work, together with their recommendations. A copy of said report shall be laid before Congress by the President with his annual message.

SEC. 7. That immediately after the organization of said board, as hereinbefore provided for, the Secretary of the Treasury of the United States shall cause an account to be stated with the Maritime Canal Company of Nicaragua, which shall include all necessary and proper expenditures made by said company since the 3rd day of June, 1889, in and about the construction of said canal or incident thereto, including all railroad and telegraph lines built by said company. For the reimbursement of said expenditures, so ascertained and by him approved, there shall be issued and delivered to the agents selected by the stockholders heretofore provided for, capital

not been paid by the United States under their guaranty; but until the expiration of five years after the said canal shall be put in operation, and so long as, during said five years, the canal shall be in operation and remain under the control of the Maritime Canal Company of Nicaragua, this subrogated lien and right of the United States as aforesaid shall not be enforced by foreclosure or sale: *Provided*, That in case default shall be made by the said company at any time before the said canal shall be put into operation in the payment of interest as it becomes due, or if default shall be made in any other respect, the right of foreclosure and sale under said mortgage shall at once attach in favour of the United States, without the necessity of judicial proceedings, and may be executed upon the written order of the President of the United States, given to the Attorney-General.

SEC. 7. That after the passage of this act, and before any bonds indorsed under its provisions are issued, and after the surrender and return to the treasury of the company of all stock that may have been issued, and after the surrender and cancellation of all bonds, bond scrip, and obligations to issue bonds, the satisfaction of all liabilities of said company and the cancellation and extinguishment of all contracts and agreements of said stock of said company in an amount equal at par value to the sum of such expenditures so ascertained, which sum shall not in any event exceed $4,500,000. Said stock so issued shall be nonassessable, and the acceptance of the same shall be full satisfaction of all claims against the United States or the Maritime Canal Company of Nicaragua.

SEC. 8. The United States hereby reserves the right to purchase the stock issued as hereinbefore provided for, other than that issued to the United States and the States of Nicaragua and Costa Rica, at any time, at such sum as may be agreed upon by the Secretary of the Treasury and the said stockholders, which sum shall in no event exceed the par value of said stock, together with 3 per cent. per annum thereon from the date of the issue to the opening of the Nicaragua Canal to commerce. No dividend upon said stock shall ever be made by said directors except from the net earnings of said corporation.

SEC. 9. That to secure the means to construct and complete said canal, and to meet expenditures made on account thereof, the said Maritime Canal Company of Nicaragua is hereby authorized to issue coupon or registered bonds, or both, of the said company, in denominations of not less than $50 nor more than $1,000, to an

company with individuals or corporations, except the concessions from Nicaragua and Costa Rica, but including its contract or agreement with the Nicaragua Canal Construction Company for the construction of the said canal, as is provided for in this act, and after the acceptance of the provisions of this act by a resolution of the stockholders of said company at a meeting duly called and held for this purpose, a distribution and disposition of the capital stock of the said Maritime Canal Company of Nicaragua shall be made by the officers of the company, as follows, to wit:

First. Seventy million dollars of the capital stock of said company at the par value thereof shall be issued to the United States in consideration for its guaranty of the bonds of the company as provided in section 5 of this act, and the said stock so to be issued shall be full paid and nonassessable and shall be deposited in the Treasury of the United States.

Second. That $6,000,000 of the said capital stock at the par value thereof shall be issued to the Government of the Republic of Nicaragua, and $1,500,000 of the said stock at the par value thereof shall be issued to the Government of Costa Rica, according to the terms of their respective concessions heretofore made.

Third. The remaining stock of amount not exceeding $70,000,000, to be dated on the 1st day of July, 1895, to be payable on the 1st day of July 1925, but redeemable at the pleasure of the United States at any time after the 1st day of July, 1905, with interest at the rate of 3 per cent. per annum, payable quarterly on the 1st days of October, January, April, and July of each year, from the delivery of the bonds to said company by the Secretary of the Treasury from time to time as by this act required: *Provided*, That the President of the United States may at any time suspend the issue of said bonds until Congress, being informed by him of the reasons for such suspension, shall otherwise direct. And said bonds shall be secured by a first mortgage on its property and rights of property now existing or hereafter acquired, of all kinds and descriptions, real, personal, and mixed, of all franchises and rights of the said company, including its rights and franchise to be a corporation. Such mortgage shall contain a provision for a sinking fund sufficient for the payment of said bonds at maturity in accordance with the provisions of section 12 of this act. Such mortgage shall be so framed as to be valid as a first lien under the laws of Nicaragua and Costa Rica. The form and sufficiency of such mortgage as the first lien upon the Nicaragua Canal and of the pro-

the company, to wit, $22,500,000, at the par value thereof, shall be disposed of as hereinafter provided.

SEC. 8. That to enable the Maritime Canal Company to take up, cancel, and extinguish all issues of its stock heretofore made, except those made to the Governments of Nicaragua and Costa Rica, and all outstanding obligations for stock, bonds, or bond scrip heretofore entered into by said company, the stock of said company, with the approval of the Secretary of the Treasury, shall be issued to the persons or corporations to be designated by said company not to exceed in the aggregate the sum of $7,000,000 at its par value, which stock shall be nonassessable. The amount of stock so to be issued shall be finally determined by the Secretary of the Treasury, on principles of justice and equity, but shall not exceed $7,000,000.

SEC. 9. That the proceeds of the remainder of the capital stock, if sold, be applied exclusively to the construction of the said canal, and the company may offer the said stock for subscription and sale at such time or times and at such price or prices as they shall, in their discretion, determine, but in no case shall the said stock or any part thereof be issued or sold except for cash, nor at any price less than its par value.

SEC. 10. That the working vision for the sinking fund shall, before execution, be approved by the Attorney-General of the United States, and the trustees named in such mortgage shall be approved by the Secretary of the Treasury. Said mortgage shall be duly executed in triplicate by the officers of said company, and shall be recorded in the office of the Secretary of the Treasury in Washington and in the proper offices in Nicaragua and Costa Rica, to be designated by the said States; and as additional security for the payment of said bonds, and to save the United States harmless by reason of its guaranty of the same, there is hereby created a first lien in favour of the United States upon the Nicaragua Canal.

SEC. 10. That the said mortgage bonds shall be prepared, engraved, and printed at the Bureau of Engraving and Printing, in the city of Washington, at the expense of said Maritime Canal Company of Nicaragua, and, after being duly executed by the officers of said company, shall be deposited in the Treasury of the United States at Washington, and shall be issued by the Secretary of the Treasury from time to time to the said Maritime Canal Company of Nicaragua only as the work on the Nicaragua Canal progresses, as hereinafter provided. Before the issue of said bonds by the Secretary of the Treasury he shall cause to

capital immediately available for continuing the construction of the canal may be derived from the proceeds of sale of the company's treasury stock, as provided in section 9 of this act, but should the company not be able to dispose of said stock at par within a reasonable time the Secretary of the Treasury shall, upon the application of the board of directors, deliver to the said Maritime Canal Company bonds of said company, guaranteed as aforesaid, amounting at the par value thereof to the sum of $2,000,000, said bonds to bear interest from the date of the delivery; and the proceeds of said bonds, when sold by order of the company, shall be used as a working capital, and shall be applied exclusively to the construction of said canal and shall be accounted for by said company in the final settlement of its accounts for construction and deducted from the total amount of bonds which it may become entitled to receive under the provisions of this act.

SEC. 11. That the Secretary of the Treasury shall cause an account to be stated with the Maritime Canal Company of Nicaragua, as soon as practicable after the passage of this act, which shall include all necessary and proper expenditures made by said company since the 3rd day of June, 1889, in and about the construction of the said canal, or incident thereto, including be engraved and printed and duly executed on each of said bonds the guaranty of the United States, in the words and figures following, to wit: "The United States of America guarantees to the lawful holder of this bond the payment by the Maritime Canal Company of Nicaragua of the principal of said bond and the interest thereon as it accrues." And the Secretary of the Treasury is hereby authorized and directed, if the interest on said bonds as it becomes due is not paid into the Treasury of the United States by the Maritime Canal Company of Nicaragua, to pay the same, and the sum required for that purpose is hereby appropriated out of any money in the Treasury not otherwise appropriated. And all payments of principal of said bonds, or the interest thereon, shall be made through the Treasury of the United States.

SEC. 11. The Maritime Canal Company of Nicaragua shall pay into the Treasury of the United States the interest on the guaranteed bonds herein provided for as it becomes due, and the guaranty of the United States shall not be held or construed as lessening the liability of said company as the principal obligor in said bonds. Upon the failure of said company to pay the interest as it becomes due on said bonds, and upon the payment of such interest by the United States,

ing the railroad and telegraph lines built by said company. For the liquidation of the amount of such expenditures so ascertained, and by him approved, he shall deliver to said Maritime Canal Company the bonds of said company in an equal amount, but not to exceed $4,500,000, with the guaranty of the United States thereon, as provided in section 5 of this act.

SEC. 12. That the President of the United States is hereby authorized and directed to cause careful and detailed estimates and statements to be made, from time to time, by duly appointed inspectors of his own selection, but not less often than quarterly each year, of the actual cost of all the work done, and of the plant, material, and services supplied on said canal, including reasonable costs of administration during each quarter, or since the last preceding estimate, and upon the filing with the Secretary of the Treasury of said estimate, duly certified by the inspectors, the said Secretary of the Treasury shall deliver to said Maritime Canal Company of Nicaragua the bonds of the said company, guaranteed as aforesaid, to the amount sufficient to pay such cost and also for the amount of the interest to become due upon its outstanding bonds before the next quarterly estimate; but the total amount of such bonds to be delivered shall not exceed the total cost of said canal and its the said company shall be charged with and shall pay to the United States the amounts paid by the United States on such guaranty, with interest annually at 4 per cent. until paid.

SEC. 12. That for all sums that the United States may pay upon the principal or interest of said bonds under their said guaranty the United States shall be subrogated to all rights and liens under the said mortgage which the holders of said bonds or any of them would have had in respect thereof if the same had remained unpaid by the Maritime Canal Company of Nicaragua and had not been paid by the United States under their guaranty; but until the expiration of five years after the said canal shall be put in operation, and so long as, during said five years, the canal shall be in operation and remain under the control of the Maritime Canal Company of Nicaragua, this subrogated lien and right of the United States as aforesaid shall not be enforced by foreclosure: *Provided*, That in case default shall be made by the said company at any time before the said canal shall be put into operation in the payment of interest as it becomes due, or if default shall be made in any other respect, the right of foreclosure under said mortgage shall at once attach in favour of the United States, without the necessity of judicial proceedings, and may be

equipment; and the proceeds of all said bonds shall be wholly applied in payment of the cost of the construction, equipment, maintenance, and operation of such canal and of the railroad, telegraph line, and vessels used in the construction thereof, or incidental thereto, and reasonable expenses of administration, and the accrued interest upon the outstanding bonds of the company, and such bonds shall not be sold or disposed of at less than par; and it shall be satisfactorily shown to the Secretary of the Treasury, before delivering any instalment of bonds as aforesaid, that the proceeds of prior instalments of bonds have been properly applied in the payment of the cost of construction and maintenance as aforesaid and interest on the bonds of the company. A sum or sums necessary to pay the expense of making the inspections and estimates provided for in this section is hereby appropriated, out of any money in the Treasury not otherwise appropriated, but all expenditures so made by the United States shall be refunded and repaid by the said company upon a final accounting.

SEC. 13. That to secure the proper application of the aid to be furnished by the United States by this act, and for the better and more economical execution of the powers conferred by this act and the act to which it is an amendexecuted upon the written order of the President of the United States, given to the Attorney-General. Out of its net earnings each year the said corporation shall pay, first, the interest upon the bonded debt guaranteed by the United States; second, they may declare, out of the balance of the net earnings, a dividend upon the stock, in no year to exceed 5 per cent., and the balance of the net earnings, if any there be, shall be paid into the Treasury of the United States and constitute a sinking fund for the payment of the principal and interest of the mortgage. All dividends paid upon stock owned by the United States shall also be paid into said sinking fund, and the Secretary of the Treasury shall, as rapidly as possible, apply the same to the extinguishment of said mortgage debt.

SEC. 13. That the said canal shall be constructed under the supervision and according to the plans and specifications prepared by the Engineer Department of the United States Army.

The President of the United States, upon the recommendation of the Chief of the Engineer Corps of the United States Army, shall detail three competent engineers from the War Department to enter regularly the service of the Maritime Canal Company, one of whom shall be chief engineer of said canal, and thereafter shall detail

ment, section 4 of the act approved February 20, 1889, entitled "An act to incorporate the Maritime Canal Company of Nicaragua," be, and is, so amended that ten of the fifteen directors of said company shall be appointed by the President of the United States, by and with the advice and consent of the Senate, not more than five of whom shall be appointed from one political party; and five of whom shall hold office for one year and five for two years, as may be designated in their appointments, and their successors shall hold office for two years. And all parts of said act approved February 20, 1889, inconsistent with this act are hereby repealed.

SEC. 14. That all the rights and powers reserved to Congress by section 8 of the act to which this is an amendment are hereby reserved, and shall apply also to this act.

SEC. 15. That in order to make certain of the feasibility, permanence, and cost of the said canal and its accessory works a board of three engineers is hereby constituted, the members of which may be selected by the President of the United States, one from the Corps of Engineers, United States Army, one from the Engineers of the Navy, and one from civil life, and if the President, in his discretion, shall so direct, the said Board of Engineers, under the direction of such additional number as may be required from time to time by the board of directors for the construction of said canal, provided the same can be done without detriment to the public service.

That it shall be the duty of the chief engineer in making his surveys and estimates, and of the directors in letting contracts, to divide the work into such sections and parts as will secure the completion of said canal with the utmost expedition.

That said canal company shall pay annually into the Treasury of the United States the official salaries of said engineer officers while in the employ of said company, and, in addition thereto, shall pay to said officers for their use 25 per cent., of such salaries.

SEC. 14. That the board of directors shall quarterly file with the Secretary of the Treasury a detailed statement of the work done and the expenses incurred therefor during the preceding quarter and the amount due and payable thereon, together with all other expenses incurred by said board, and on his examination and approval of said statement he shall issue and deliver to said board of directors bonds sufficient at their par value to cover the amount approved by him.

SEC. 15. That the said Maritime Canal Company shall not issue any bonds or mortgages except as herein provided, and shall not indorse

the Secretary of State, shall visit and carefully inspect the route of the said canal, to examine and consider the plans, profiles, sections, prisms, and specifications for its various parts, and report thereupon to the President of the United States.

SEC. 16. That, for the purpose of paying the necessary expenses of the board of engineers created by section 15 of this act, if the President of the United States shall appoint them and call them into service, the sum of $15,000, or so much thereof as may be necessary, is hereby appropriated, out of any money in the Treasury not otherwise appropriated: *Provided*, That the compensation of the members of said board of engineers from civil life shall be fixed by the President; and the Secretary of State, with the approval of the President of the United States, shall make all needful regulations for carrying this and section 15 of act into execution. And the Secretary of the Treasury, with the approval of the President, shall make all needful regulations for carrying into effect all other parts of this act and the act to which it is an amendment.

or guarantee the paper, contract, or obligation of any person, persons, or corporation whatsoever, except as herein provided, and no contract shall be entered into or purchase made by said company beyond the amount of bonds authorized to be issued by this act.

SEC. 16. That the bonds so issued to said directors shall be disposed of by them at not less than their par value, and the proceeds arising from such sales shall be paid into the treasury of the canal company and shall be used for the extinguishment of the company's indebtedness contracted after the appointment, by the President of the United States, of the eight directors herein provided for.

SEC. 17. That Congress shall at all times have the power to alter, amend, or repeal this act, and this act shall be null, void, and of no effect if the Maritime Canal Company of Nicaragua shall fail to comply with the requirements of section 3 of this act and to communicate to the Secretary of the Treasury its acceptance of the terms and conditions of this act within nine months from the passage thereof.

SEC. 18. That all acts and parts of acts inconsistent with the provisions of this act are hereby repealed.

AMENDMENTS TO BILL S. 1481 (SENATE).

Add at the end of section 10, and as a part of said section, the following proviso:

"PROVIDED, that all sums expended in the purchase of material and supplies in and about the construction of said canal, including dredging machinery and ships, shall be purchased in the United States, except such material and supplies as may be grown or produced in Nicaragua or Costa Rica or not grown or produced in this country."

After the word "years," in line 14, section 13, insert:

"And the President shall have power to remove anyone or all of the Directors appointed by him whenever in his opinion the public interests will be promoted thereby, and he may, by and with the advice and consent of the Senate, appoint successors to such of the Directors as may be removed by him."

Add to section 8 as a part of said section:

"And no more than $1 in the stock of said Company shall be issued for each dollar in truth and in fact expended by said Company."

Insert as section $15\frac{1}{2}$:

"The Directors in letting contracts shall divide the work into such sections and parts as will secure the completion of said canal with the utmost expedition, and all contracts shall be let to the lowest responsible bidders after advertisement, they giving bond for the performance of the work, to be approved by the Secretary of the Treasury, who shall also prescribe the extent of the advertising of proposals to be required; and the aggregate amount of such accepted bids for the entire completion and finishing of said canal shall not exceed $70,000,000."

After the amendment in section 13, add:

"Which Directors shall be citizens of the United States, and no two of them shall be residents of the same State."

Add to section $15\frac{1}{2}$, the following:

"No contract for the construction of the whole or any part of said canal shall be let to any company, association or corporation in which any stockholder or Director of the Maritime Canal Company is a member or stockholder, or in which he is in anywise interested."

Insert, after the word "States," the words "in absolute ownership;" so as to make that part of section 7 read:

"Seventy million dollars of the capital stock of said Company at the par value thereof shall be issued to the United States in absolute ownership in consideration, etc."

In section 13, insert, after the words "United States," "from time to time during the term of the existence of said Corporation;" so as to read:

"That 10 of the 15 Directors of said Company shall be appointed by the President of the United States from time to time during the term of the existence of said Corporation, by and with the advice and consent of the Senate, etc."

In section 9, after the word "sold," insert "shall;" so as to read:

"That the proceeds of the remainder of the capital stock, if sold, shall be applied exclusively to the construction of the said canal."

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CHISWICK PRESS:—CHARLES WHITTINGHAM AND CO.
TOOKS COURT, CHANCERY LANE, LONDON.